The RUBBER AGE

December, 1942

TECHNOLOGY DEPT.

KALVAN AND KALITE

*

Produce results reasonably like the soft carbons, i. e., P-33 and THERMAX.

The demand for those blacks now exceeds the available supply.

Consider, if you will, using more KALVAN and KALITE.

* *Ask for our laboratory folder*

R. T. VANDERBILT CO., Inc.

230 Park Avenue, New York City

Newsletter No. 12 *PUBLISHED BY RUBBER CHEMICALS DIVISION OF* DU PONT *DEC., 1942*

Heliozone Retards Sun Checking of Buna S Vulcanizates

BUNA S vulcanizates which are to be used out-of-doors should be protected by the inclusion of a sun-checking inhibitor in the compound. When such a protective ingredient is not included, the stocks will crack readily when exposed to either direct or reflected sunlight.

DYNAMIC SERVICE—The sun-checking of vulcanizates in static service is not of great importance, although such sun checking is undesirable. However, sun checking becomes a major disadvantage when Buna S stocks are exposed to sunlight and are flexed or deformed. When a small crack or cut mars the surface of a Buna S vulcanizate, flexing or deforming the product will cause the crack to grow rapidly by tearing and will result in early failure.

Although it is impossible to guard against all of the hazards that cause cuts or cracks in products such as belts, footwear, coated fabrics and tires, it is entirely possible to protect Buna S from sun checking by the addition of small quantities of Heliozone to the Buna S compound.

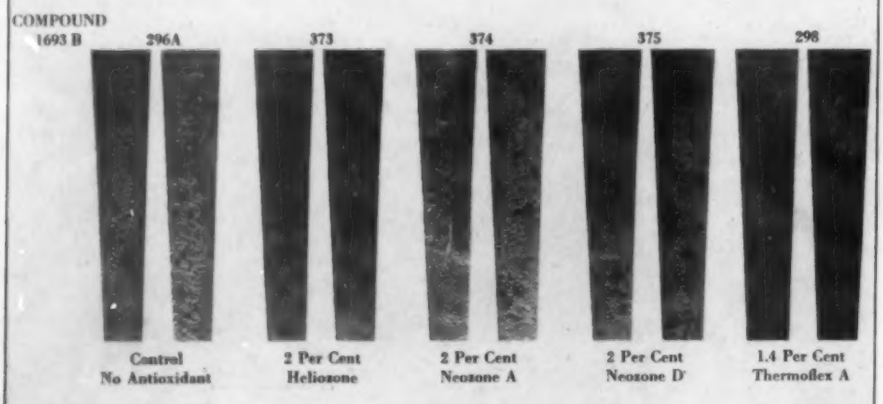
HELIOZONE EFFECTIVE—Heliozone has been of considerable advantage in improving the sun-checking resistance of natural rubber. It has even greater possibilities in Buna S stocks where all possible measures must be taken to retard the formation of small cracks or checks.

Heliozone is made from a specially selected group of waxy materials having a specific gravity of 0.90 and a melting point of 67°C. Because it melts at mixing temperatures, it disperses easily in the stock. Heliozone functions by blooming to the surface after cure, forming a smooth, continuous, transparent, colorless, plastic film which can be scraped off only with difficulty. The film retains its flexibility at temperatures as low as 0°F., and does not melt and disappear into the Buna S at hot summer temperatures.

The accompanying photograph illustrates the beneficial effect of Heliozone on the sunlight resistance of Buna S vulcanizates and compares the effectiveness of Heliozone with Neozone D, Neozone A, and Thermoflex A as sunchecking inhibitors.

FIG. 5

DIRECT SUNLIGHT — TWO WEEKS



Photographs illustrate effect of Heliozone and other antioxidants on sun checking resistance of Buna S vulcanizates (Sample stretched 15%, South exposure, 45° Vertical angle, Two weeks, August, 1942)

Through the Mill

THE NEOPRENES— *A recently published report having this title is a valuable addition to the compounder's library. To the mechanical goods compounder it is particularly useful in these times of new products and new and changing specifications. "The Neoprenes" describes in detail the properties of the several general and special types of neoprene so that the best type of neoprene may be selected readily for any specific application. A copy of "The Neoprenes" will be gladly sent without charge to any rubber technical man making the request on his company letterhead.*

BUNA S—*Have you tried Thionex acceleration either alone or activated with Accelerator 808 or DPG? The processing, safety, rapid rate of cure at 274°F. and long curing range are the interesting and outstanding advantages of Thionex accelerated Buna S compositions. The development of improved Buna S stocks is one of the most important jobs in our laboratory today. Make the DuPont Rubber Laboratory your headquarters for discussing problems, both general and specific, regarding rubber and synthetics.*

ACCELERATORS *for stocks in which all of the hydrocarbon is present in the form of reclaimed rubber are of major importance under present conditions. We suggest the following accelerator combinations as being particularly effective in all reclaim stocks:*

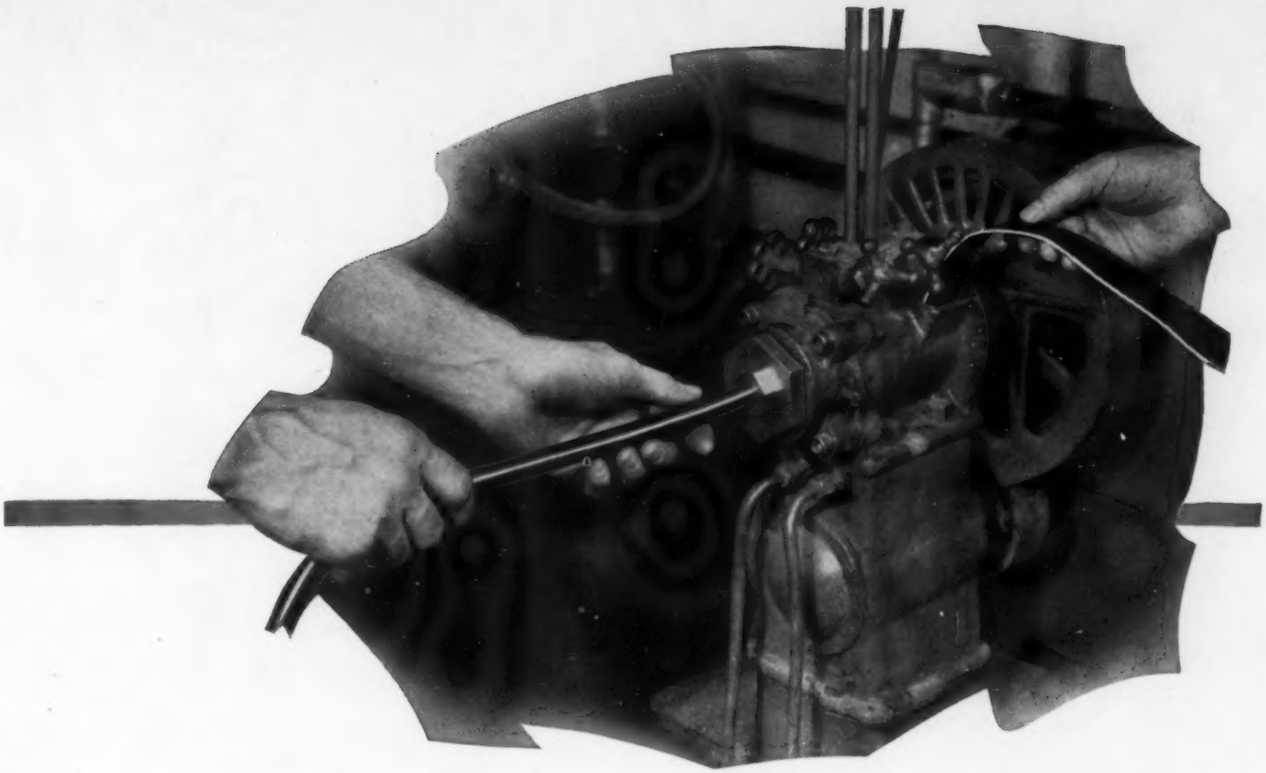
1. *Thionex - litharge*
2. *2-MT - Accelerator 808*
3. *Zenite - litharge (no zinc oxide)*
4. *Zenite - DOTG*
5. *MBTS*
6. *MBT*
7. *Accelerator 808*
8. *DOTG*

We should be glad to recommend a specific combination to meet your particular requirements.

RUBBER CHEMICALS DIVISION

Wilmington DU PONT *Delaware*

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year. Canada, $3.50; Foreign, $4.00. December, 1942. Vol. 52, No. 3.



Did somebody want a synthetic that *tubes*?

To rubber fabricators who have been having difficulty tubing synthetics, this is an important picture. It shows a piece of Hycar, aircraft specification stock, being tubed on a test extruder in our Customer Service laboratory.

Of course, to the many who are well aware of Hycar's excellent tubing qualities, this is old stuff. They know from experience the fine, smooth finish and the fast rate of extrusion obtainable with Hycar.

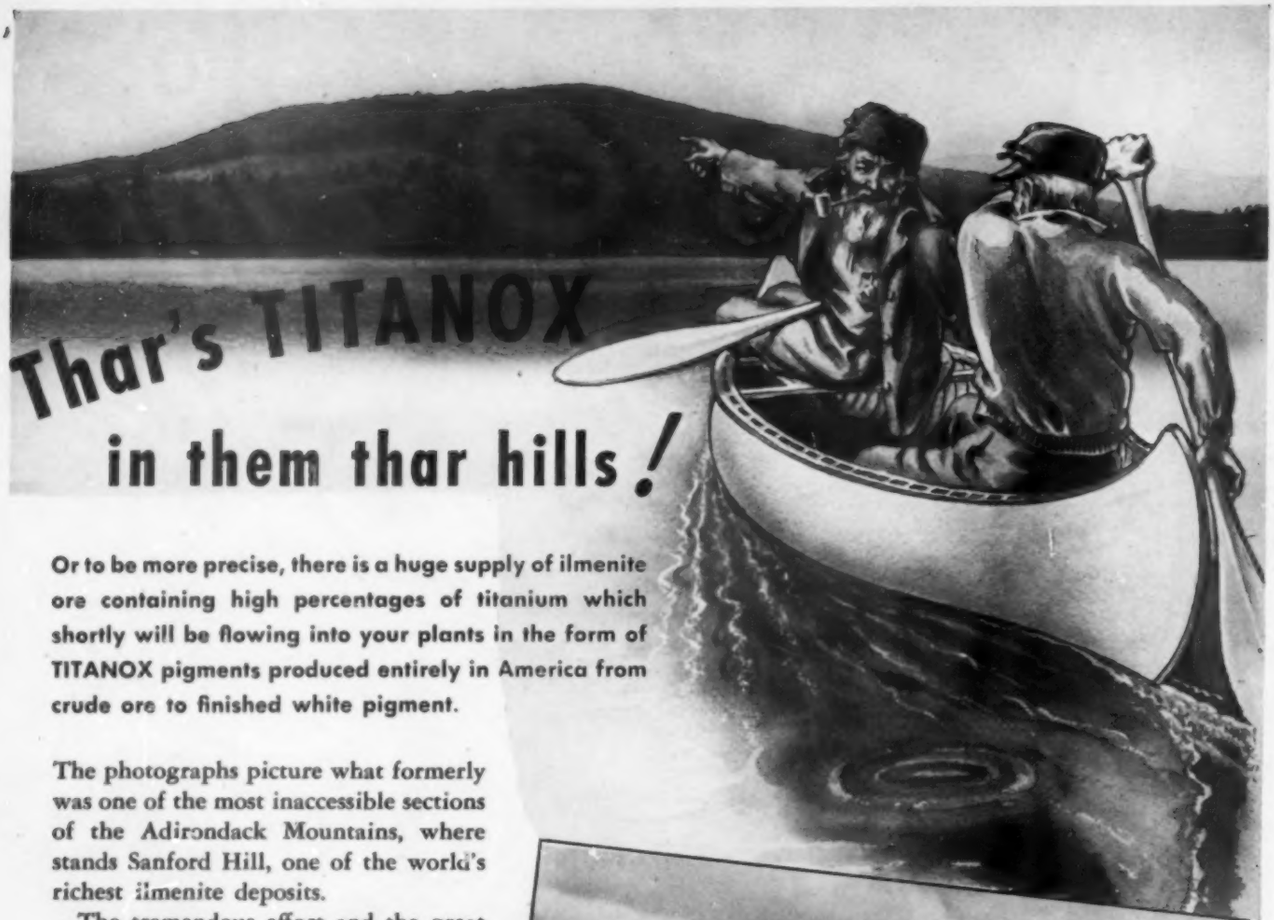
To them this is a reminder, however, that significant new developments are coming from this laboratory every day; that, for example, tubing stocks of 40 Durometer hardness for cures in open steam are now out of the lab and in production.

To others this is an invitation to make full use of our complete, up-to-the-minute facilities and staff in solving problems and perfecting products of synthetic rubber.

HYCAR
Synthetic **Rubber**

HYCAR CHEMICAL COMPANY, *Akron, Ohio*

LARGEST INDEPENDENT PRODUCER IN AMERICA OF BUTADIENE SYNTHETIC RUBBER



Thar's TITANOX in them thar hills!

Or to be more precise, there is a huge supply of ilmenite ore containing high percentages of titanium which shortly will be flowing into your plants in the form of TITANOX pigments produced entirely in America from crude ore to finished white pigment.

The photographs picture what formerly was one of the most inaccessible sections of the Adirondack Mountains, where stands Sanford Hill, one of the world's richest ilmenite deposits.

The tremendous effort and the great cost required to make possible your continuous reception of titanium pigments are contributions of the Titanium Pigment Corporation in this emergency to the solution of Rubber Industry problems. It is offered as evidence of our purpose to give you the best service of which we are capable.

Section of Mill development.

Sub-Level No. 1
Benches No. 1 and 2

TITANIUM PIGMENT CORPORATION
SOLE SALES AGENT

111 B'way, New York, N. Y • 104 South Michigan Ave., Chicago, Ill. • 350 Townsend St., San Francisco, Cal. • 2472 Enterprise St., Los Angeles, Cal.

TITANOX
TRADE MARK

NAFTOLEN*

*REG. U. S. PAT. OFFICE

the TACKIFIER *for Buna S*

● To obtain tacky and easy-processing Buna S stocks, use NAFTOLEN in proportions of 20% or higher in your formulations. Because NAFTOLEN co-vulcanizes with Buna S, the use of large proportions will not impair the physical properties of the vulcanizates.

WILMINGTON CHEMICAL CORPORATION
10 East 40th Street · New York, N. Y.
Plant and Laboratory: Wilmington, Delaware

W
-C=C-
REG. U. S. PAT. OFFICE

AVAILABLE NOW!

PICCO

Softeners

FOR NATURAL AND SYNTHETIC RUBBER

The following PICCO Coal Tar Polymers and Resins, having the specific qualities needed for softeners, are available now!

Manufactured under rigid quality control, you can specify PICCO Products with absolute assurance of complete satisfaction.

TYPE	USES
XX-100	for high durometer stocks
420-S	for light colored, intermediate hardness stocks
430	for dark colored, intermediate hardness stocks
Di Polymer Oil	for low durometer stocks

PENNSYLVANIA
INDUSTRIAL CHEMICAL CORPORATION
CLAIRTON, PENNA.

For information on all Picco Products except reclaiming materials, write Standard Chemical Company, Akron Savings and Loan Building, Akron, Ohio. Refer inquiries on the reclaiming of rubber to C. H. Campbell, 907 Crain Avenue, Kent, Ohio.

Makers of: Coumarone Resins • Coal Tar Naphthas • Rubber Plasticizers • Reclaiming Oils • Terpene Resins

SCRAP RUBBER

Essential before Pearl Harbor

Indispensable **NOW**

We are doing our very best
to fill the gap

●

H. MUEHLSTEIN & CO., INC.

122 EAST 42ND STREET, NEW YORK, N. Y.

CHICAGO	AKRON	LOS ANGELES	MEMPHIS	BOSTON
327 So. La Salle St.	250 Jewett St.	318 W. 9th St.	62 Auction Ave.	31 St. James Ave.

for **INSULATED WIRE**

Tensile strength

Resistance to aging

Dielectric strength

Write Our Technical Service Dept. for Details.

MOORE & MUNGER

33 RECTOR STREET - NEW YORK CITY

JOHN ROYLE & SONS

10 ESSEX STREET · PATERSON, N. J.

Makers of
EXTRUSION MACHINERY
for RUBBER, PLASTICS AND
KINDRED COMPOUNDS

CABLES: ROYLE, PATERSON

ROYLE
PATERSON
N.J.

Founded
1855

Makers of
PHOTO ENGRAVING MACHINERY
JACQUARD CARD CUTTING
MACHINERY

PHONE SHERWOOD 2-8262

December, 1942

To The Rubber Industry
Everywhere.

Dear Friends:-

Your understanding cooperation through these war months has been most gratifying. No manufacturer ever served so grand a group as we have the good fortune to work with in the Rubber Industry. We do appreciate your continuing friendliness under trying circumstances.

In 1943 we covet the opportunity to help you win a war and build a lasting Peace. To that end we pledge you every assistance possible.

May we all find within ourselves the faith and the courage and the energy to do this job speedily and well!

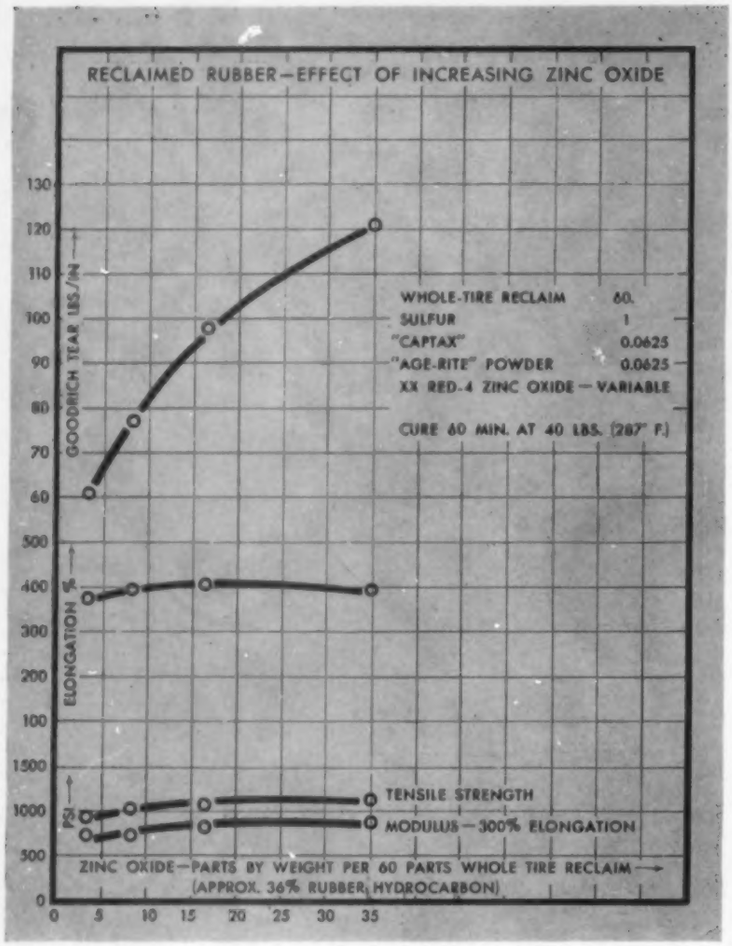
Merry Christmas!

Most sincerely yours,

John Royle & Sons

JOHN ROYLE AND SONS

KV:EMB



Improve Reclaim Compounds with Increased Amounts of Zinc Oxide

It has been quite generally recognized that improved physical properties result from the addition of zinc oxide to compounds containing reclaimed rubber, irrespective of the amount of residual zinc oxide present in the reclaim.

This fact is of current interest due to the rubber conservation program and the necessity of using all-reclaim or high proportions of reclaim in many important but less critical compounds.

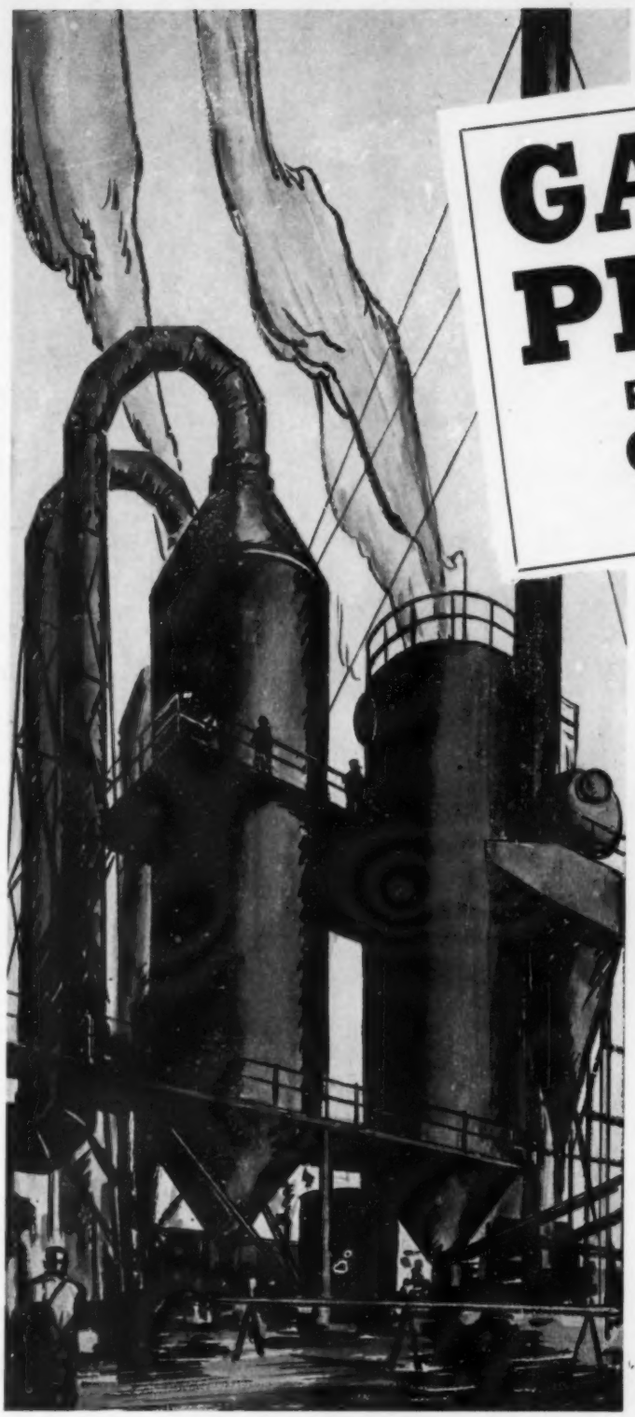
The improved physical properties — Tensile Strength, Tear Resistance, etc. — are accompanied by improvement in processing characteristics.

These effects were first brought out in a comprehensive study by Winkelmann and Croakman, published in *"Industrial and Engineering Chemistry,"* Volume 20, Page 134 in 1928.

New Jersey Zinc

THE NEW JERSEY ZINC COMPANY • 160 FRONT STREET, NEW YORK

UNIFORM QUALITY ZINC OXIDES • • THE HORSE HEAD BRANDS



GASTEX & PELLETEX

REENFORCING BLACKS Go "ALL OUT" for VICTORY

GASTEX and PELLETEX are so vital to our war effort in rubber conservation, reclaims, and the compounding of synthetics that our entire output has been placed on allocation under WPB Order M-244. Shipments can be made only on specific Government license for each individual order.

There's no rationing or regulation of service and friendship, however. So, in extending to you the season's greetings, we offer our continued close cooperation in your development plans, with the belief that when the war and peace have been won, you will find many new and expanded uses for our products.

GASTEX TRADE MARK

HERRON & MEYER

OHIO BLDG., AKRON, OHIO.

GENERAL SALES AGENTS FOR

GENERAL ATLAS CARBON DIVISION

OF GENERAL PROPERTIES COMPANY, INC.

PAMPA, TEXAS — GUYMON, OKLA.

PELLETEX TRADE MARK

DISTRICT SALES AGENTS

ERNEST JACOBY & CO., Boston

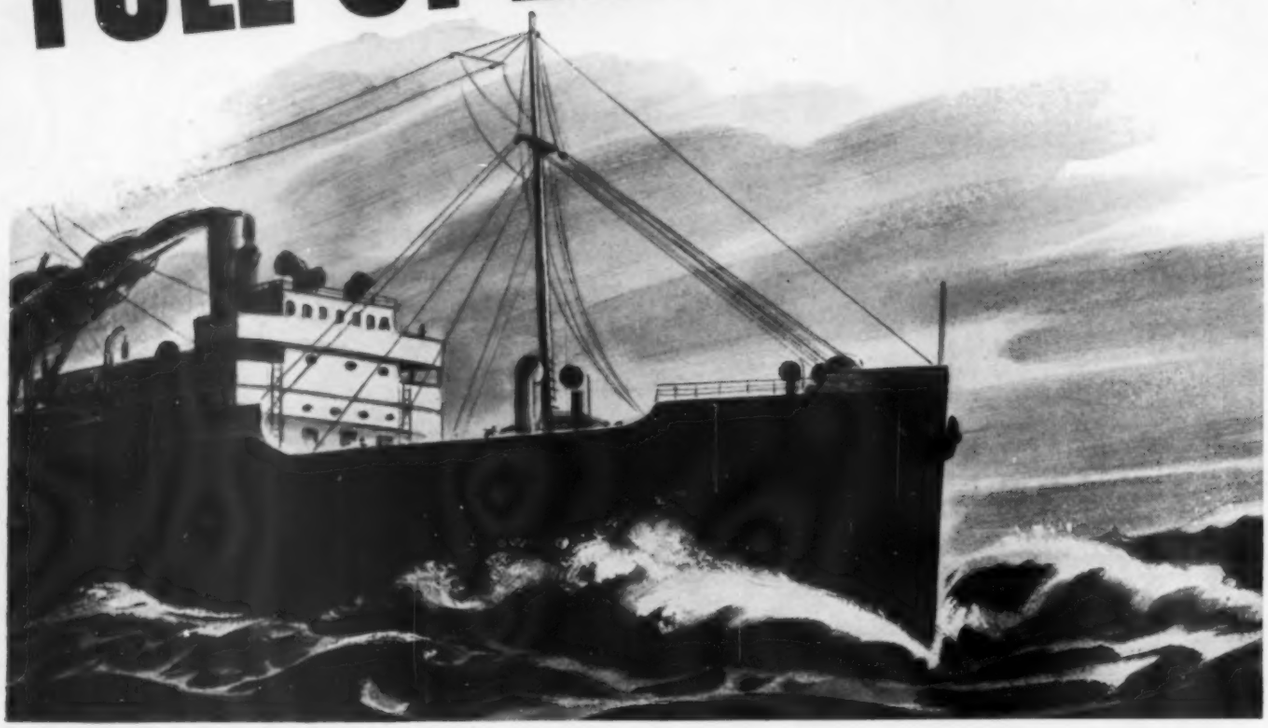
H. M. ROYAL, INC., Trenton, N. J.

HERRON & MEYER, New York - Chicago

THE C. P. HALL CO. OF CALIF., Los Angeles

ST. LAWRENCE CHEMICAL CO., LTD., Toronto - Montreal

FULL SPEED AHEAD!



SURMOUNTING the difficulties attendant to making delivery of *what you want when you want it* is all a part of our regular day's work. When you MUST have solvents right now, *or else*—tell it to us and you'll get them. The entire Skellysolve organization is geared to heavy-duty performance. It had to be that way to get where it is today!

As to unvarying dependability of Skellysolve quality—that important point is fully guaranteed.

SKELLYSOLVE
in the
RUBBER INDUSTRY

There are six different types of Skellysolve which are especially adapted to various uses in the rubber industry, for making rubber cements, and for many different rubber fabricating operations. Skellysolve offers many advantages over benzol, rubber solvent gasoline, toluol, carbon tetrachloride, etc. It will pay you to investigate Skellysolve. Write today.

SKELLY

SKELLYSOLVE

SOLVENTS DIVISION, SKELLY OIL CO.
SKELLY BLDG., KANSAS CITY, MO.

MIX →

WITH →

FOR →

In the cause of victory few things are more vital than conservation of the nation's dwindling rubber supplies. But fortunately there are hundreds of thousands of tons of scrap rubber available. Fortunately, too, there is no shortage of Barrett Carbonex* S.

When used in reclaim rubber stocks this improved coal-tar compounding material displays a number of significant properties.

Extender—up to 15% of the rubber hydrocarbon.

Reinforcing Softener—A highly practical control of toughness.

Rapid Extrusion—Minimizes swelling, sagging and flattening.

Improved Tear Resistance—An important factor to increase wear.

Promotes Better Processing—Calendering and extruding properties greatly improved.

Excellent Aging Qualities—A final great help in conservation.

The staff of the Barrett Research Laboratories will be glad to cooperate with you in using Carbonex S and other Barrett rubber compounding materials to meet your requirements. Wire or write today for full information.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK

Barrett

ONE OF AMERICA'S GREAT BASIC BUSINESSES

*Reg. U. S. Pat. Off.

Something Worth Remembering

Anything which helps to save time and materials today is certainly *worth remembering* and *using*—and that fits the CAPITOL PROCESS OF LINER TREATMENT to a "T". This is the economical and efficient process which helps prevent adhesion of rubber to liners and aids in prolonging the life of cotton fabrics. Capitol Treated Liners have already proved their value in a large number of rubber plants. If you have not tried this process yet, SEND US A 50—OR 100 YARD LINER AND WE WILL TREAT IT WITHOUT CHARGE so you may test it in your own plant. Write today for full particulars.

★

TEXTILE PROOFERS, INC.

One Gates Avenue Jersey City, N. J.

(1) *For synthetic rubber with unusual resistance to oil...*

For synthetic rubber with high resistance to heat and cold...
(2)

For synthetic rubber with especially long life...
(3)

PERBUNAN

NOTE: If you require Perbunan for experimental work we may supply you with as much as 200 pounds per month. Otherwise all Perbunan is now allocated entirely by the Rubber and Rubber Products Branch of the War Production Board.

Write **STANCO DISTRIBUTORS, Inc.** 26 BROADWAY, NEW YORK CITY
Warehouse stocks in New Jersey, Louisiana and California

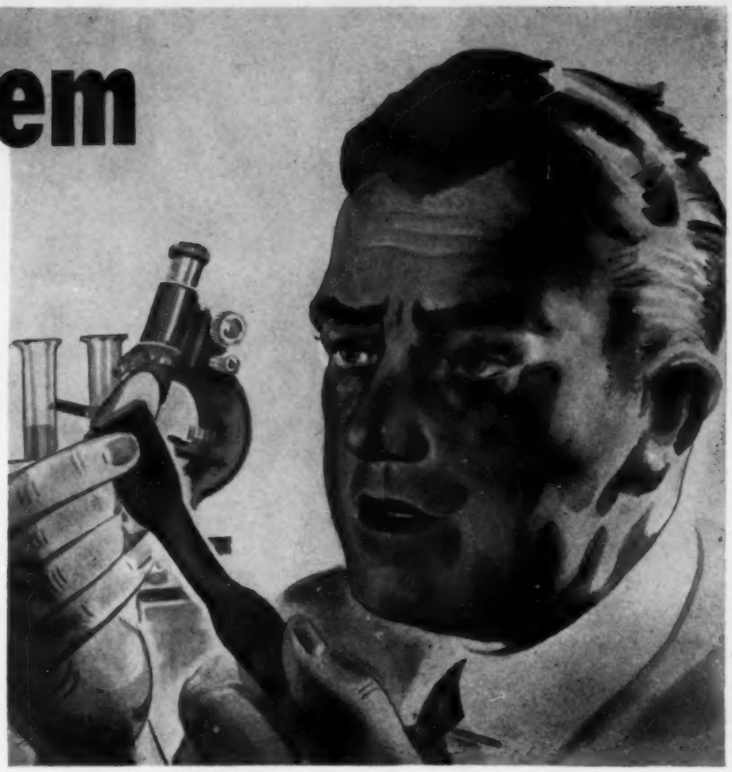
DUSTLESS CARBON BLACKS
DIXIEDENSED
KOSMOBILE

UNITED CARBON COMPANY
CHARLESTON, W. VIRGINIA

The Problem

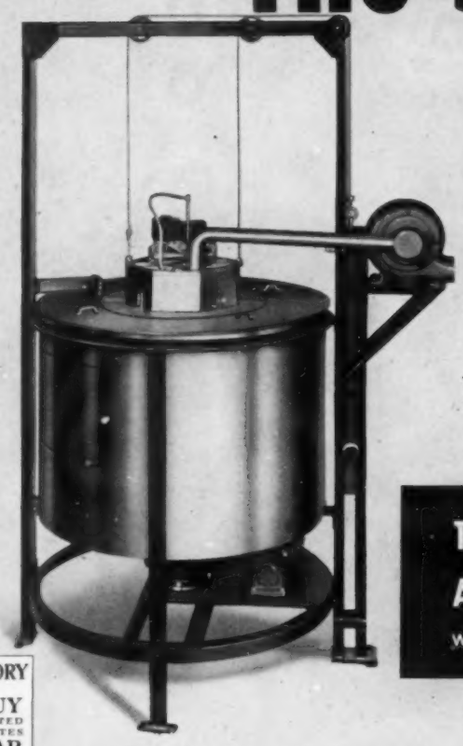
To Obtain Maximum Utility from Every Pound of our Supply and Production of

Natural Rubber
Synthetic Rubber
Reclaimed Rubber



● To conserve our supply of natural rubber, synthetic rubber, and reclaimed rubber, it is essential that every pound available be applied where its particular characteristics can be best utilized. Accelerated light aging tests are a valuable means of determining the durability characteristics of experimental and finished products under service conditions.

The Solution



● The "National" Model X-1-A Accelerated Weathering Unit is the solution to the problem of light aging. It produces results which are closely correlated with those obtained under natural conditions, but requires only a fraction of the time. Results obtained in the unit are reproducible and are not affected by such variables as weather, season and location.

The "National" X-1-A unit light ages synthetic rubbers, natural rubbers, and reclaimed rubbers accurately and quickly. The machine is included in consumer specifications, and manufacturers are using it for testing the light aging resistance of new formulations and finished products designed to meet these specifications.

Procurable on priority rating in accordance with regulations in effect at time order is placed.

THE NATIONAL MODEL X-1-A
TRADE-MARK
ACCELERATED WEATHERING UNIT
WRITE FOR DESCRIPTIVE BULLETIN

NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
CARBON SALES DIVISION, CLEVELAND, OHIO
General Offices: 30 East 42nd St., New York, N. Y.
Branch Sales Offices: New York, Pittsburgh, Chicago, St. Louis, San Francisco

RUBBER
★
SYNTHETIC RUBBER
★
PLASTICS

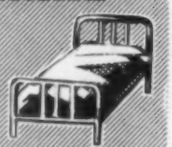
THE Schuster
MAGNETIC CALENDER GAUGE
SAVES THAT MATERIAL

For upwards of 15 years, the Schuster Magnetic Calender Gauge has unerringly set rubber calender rolls to a predetermined thickness and correctly maintained that thickness. It has saved the time of hand-miking, eliminated human error, saved the stock sampled for calender tests, and assured uniform thickness in the finished product.

All this, *at the right time—before* damage is done. And *continuously*—the only way worth while.

The instrument is simple in design . . . rugged in construction . . . practically without wearing parts . . . adjustable to any thickness. Originally used for rubber, it has taken over just as deftly for synthetic rubber, plastics, cellulose, and other media. No matter what the article, your coating must be thick enough, but not even 1/1000" too thick, or the war effort suffers irreparable loss. No matter what the material, you've got to s-t-r-e-t-c-h it as far as possible—and "possible" daily proves to have a new, elastic meaning.

Better investigate the Schuster Magnetic Calender Gauge at once, with or without automatic control. Every installation has to be engineered to the job . . . Please *give us time to do it right.*



Ask for our bulletin on the Schuster Magnetic Gauge

THE MAGNETIC GAUGE COMPANY
60 EAST BARTGES STREET AKRON, OHIO
Eastern States Representative—
BLACK ROCK MANUFACTURING CO., Bridgeport, Conn.

FACTS
about Lamp Black
in relation to
Synthetic Rubber

ELECTRON microscope analysis reveals that lamp black has a wider distribution curve than any other carbon colloid. This ensures the presence of reinforcing particles so essential to synthetic as well as to natural rubber. The average surface area is, however, in the soft or semi-reinforcing region. This ensures the low hysteresis essential to offset the heating-up tendencies of synthetic rubber. Special grades controlled as to pH, oil content and rubber compounding properties are available.

Samples and technical information will be sent upon request.

Lamp
BLACKS

with a record of more than 90 years for excellence

THE L. MARTIN COMPANY, INC.
UNIT OF COLUMBIAN CARBON CO.
Largest manufacturers of high grade lamp black in the world

BINNEY & SMITH CO.
DISTRIBUTOR OF RUBBER BLACKS
41 East 42nd Street, New York, N.Y.

LEADING MANUFACTURERS

OFFSET EXTRA HEAT IN HEAVY-DUTY TIRES

WITH Continental "AA" CARBON BLACK

THOROUGH TESTS in actual tire formulations have definitely proved that Continental "AA" Carbon Black contributes substantially less to heat generation than do standard blacks. That is why outstanding manufacturers of heavy-duty tires are changing over to this new type black. For it is the terrific heat generated by such tires in high-speed operation that most often causes tire failure.

Continental "AA" is specially processed to offset this extra heat. Its low heat generating characteristics maintain just the right balance between wear resistance in the tread compound and heat generation in the tire itself. In the production of today's heavy-duty tires—particularly tires designed for truck, bus and combat service under the worst in climatic extremes and the most severe treatment—Continental "AA" fills a vital need.

THIS NEW BLACK IS EASIER PROCESSING, TOO!

The ease with which Continental "AA" may be processed gives it still another advantage over standard grades of black used in passenger car tires. And of course, the same high quality that characterizes all grades of Continental Black has been maintained, through traditional methods of rigid laboratory control. But send for samples —find out for yourself how completely Continental "AA" meets your every requirement today.

ESPECIALLY IN YOUR BUNA S FORMULATIONS

Now is the time to evaluate the characteristics of Continental "AA" in your Buna S formulations. Let us send you additional samples for this purpose—while you are still experimenting with this type synthetic rubber.

Continental **CARBON COMPANY**

295 MADISON AVENUE • NEW YORK, N. Y.

Akron Sales Office: Peoples Bank Building, Akron, Ohio • SALES REPRESENTATIVES: Ernest Jacoby & Co., Boston, Mass. • Marshall Dill, Los Angeles and San Francisco, Calif.

FOR VICTORY TODAY AND SOUND BUSINESS TOMORROW

Get This Flag Flying Now!

This War Savings Flag which flies today over companies, large and small, all across the land means *business.* It means, first, that 10% of the company's gross pay roll is being invested in War Bonds by the workers voluntarily.

It also means that the employees of all these companies are doing their part for Victory . . . by helping to buy the guns, tanks, and planes that America and her allies *must* have to win.

It means that billions of dollars are being diverted from "bidding" for the constantly shrinking stock of goods available, thus putting a brake on inflation. And it means that billions of dollars will be held in readiness for post-war readjustment.

Think what 10% of the national income, saved in War Bonds now, month after month, can buy when the war ends!

For Victory today . . . and prosperity *tomorrow,* keep the War Bond Pay-roll Savings Plan rolling in *your* firm. Get that flag flying now! Your State War Savings Staff Administrator will gladly explain how you may do so.

If your firm has not already installed the Payroll Savings Plan, *now is the time to do so.* For full details, plus samples of result-getting literature and promotional helps, write or wire: War Savings Staff, Section F, Treasury Department, 709 Twelfth Street NW., Washington, D. C.

Save With

War Savings Bonds

This Space Is a Contribution to America's All-Out War Program by

THE RUBBER AGE

WAR CANNOT DIM

the glory of Christmas, the token of the coming of peace, goodwill to men.

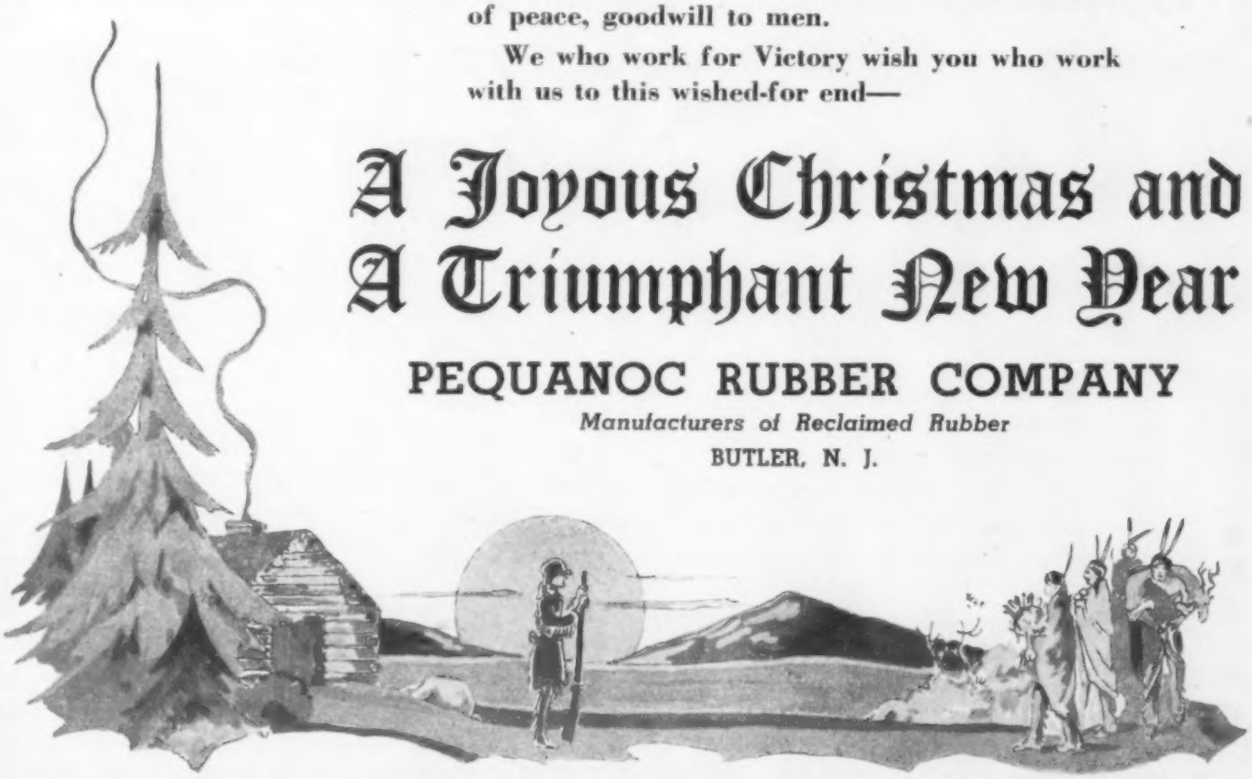
We who work for Victory wish you who work with us to this wished-for end—

A Joyous Christmas and A Triumphant New Year

PEQUANOC RUBBER COMPANY

Manufacturers of Reclaimed Rubber

BUTLER, N. J.



Three types of CALCINED MAGNESIA for neoprene

WHITTAKER
ESTABLISHED 1890

These three types of calcined magnesia meet requirements of quality and cost:

- **LIGHT**—The highest type. For the most exacting compounds. Fine particle size. Low moisture and carbonate content.
- **MEDIUM**—For less exacting requirements and where costs must be kept down. Fine particle size and low moisture content.
- **HEAVY**—Meets low cost need where high type compounding is not essential.

Samples, prices and additional information on request

WHITTAKER, CLARK & DANIELS, Inc.
260 West Broadway, New York City · Plant, South Kearney, N. J.
SALES REPRESENTATIVES

Chicago: Harry Holland & Sons
Philadelphia: Peltz & Company
Toronto: Richardson Agencies, Ltd.
Cleveland: Palmer Schuster Company

3343

REDUCE REJECTIONS . . . IMPROVE YOUR PROFITS WITH

CALCENE

Improving hot tear resistance is almost certain to cut down rejections on molded goods—and improve your profit margin.

For eight years Calcene has demonstrated its ability to improve tear resistance—even when loaded at higher levels than is possible with other standard pigments. This advantage can be important to you in the whole range from gas mask flutter valves to molded toys.

Learn at firsthand how Calcene can improve your production—and help make your rationed rubber stocks go farther in terms of finished goods.

PITTSBURGH
PLATE GLASS COMPANY
Columbia Chemical Division
Grant Building, Pittsburgh, Pa.

Chicago	Boston	St. Louis
New York	Cincinnati	Cleveland
Minneapolis	Philadelphia	Charlotte

WE ARE SERVING UNCLE SAM

Operating under the direct control and supervision of the Rubber Reserve Co. — a Federal agency — in the purchase and handling of scrap rubber, we are loaning our experience and organization to the promotion of the war effort and have ceased to operate on our own account for the period of the emergency.

We are honored in having this opportunity to do our part in helping to overcome the rubber shortage.

Serving the Trade since 1868

THE LOEWENTHAL CO.

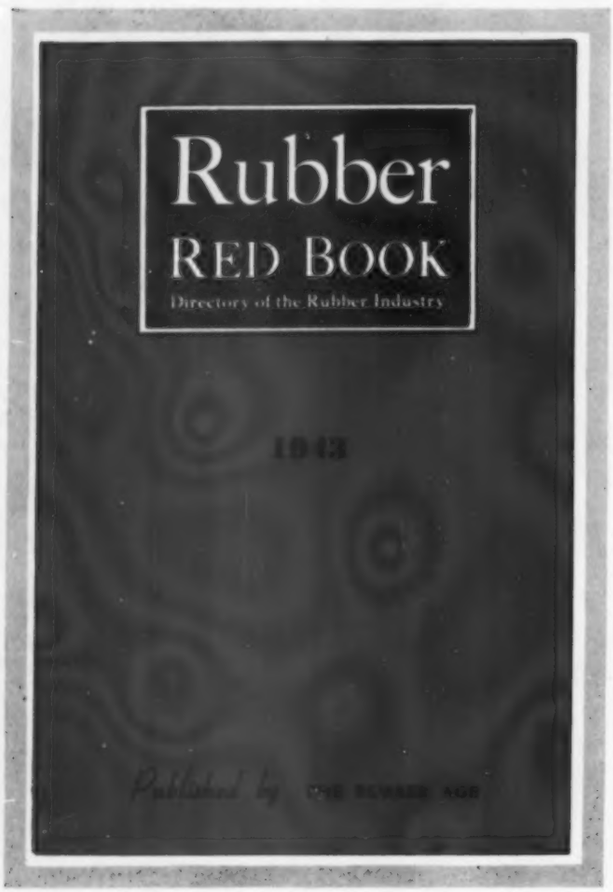
Buying Agent, Rubber Reserve Company

188 W. RANDOLPH ST.
CHICAGO, ILL.

159 CLEWELL ST.
AKRON, OHIO

★ ADVANCE ANNOUNCEMENT ★

1943 Rubber Red Book



Is Scheduled for Publication in MAY, 1943

The next issue of the RUBBER RED BOOK—the only complete Directory of the Rubber Industry—will appear about May 15, 1943. It will reflect the many changes in personnel, products, materials, equipment, processes, etc., which have occurred in the past two years as a result of the war. Accordingly, an unusual amount of interest has already been expressed by the industry in the 1943 edition—the fourth to be published.

The RUBBER RED BOOK occupies an enviable position. It is an indispensable tool of purchasing agents in rubber factories and is constantly consulted by the research, sales and development departments of these factories. Suppliers, too, find it a valuable adjunct to their sales efforts because of the mass of data it contains on the industry. Among others who make constant use of it are the procurement divisions of the Army and Navy, the development and research laboratories of the government, and in fact every department in Washington concerned with rubber, where scores of copies are in daily use.

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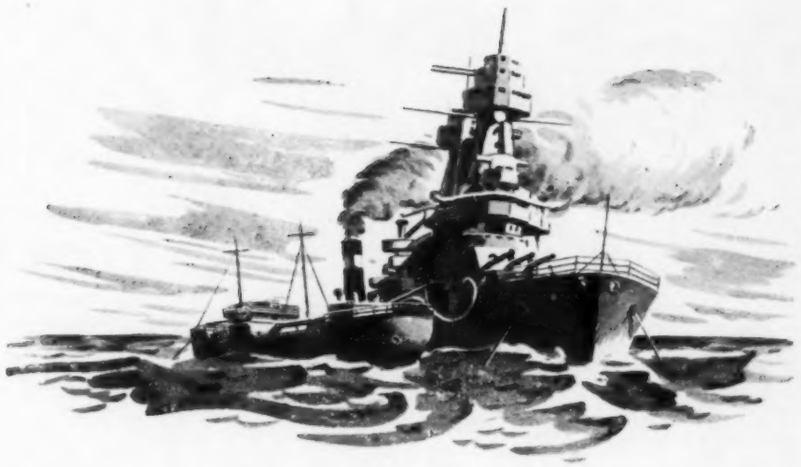

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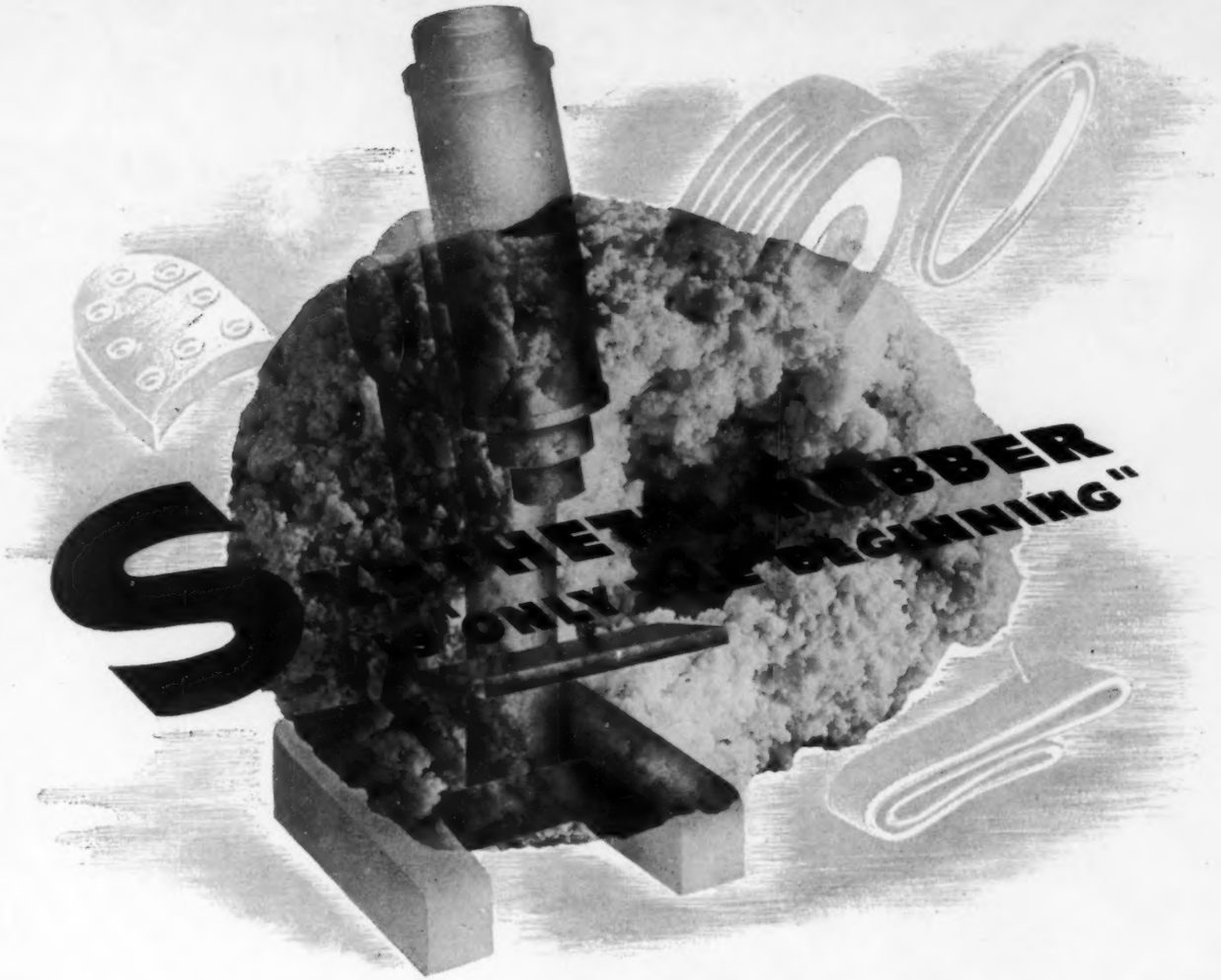

YOUR CUSTOMERS think of synthetic rubber in terms of tires, tubes, shower curtains and other finished products. But the new chemical compounds, out of which you as a manufacturer must fashion such products, are only new *raw materials,* many of which are basically different from the latex that has always been the backbone of the industry.

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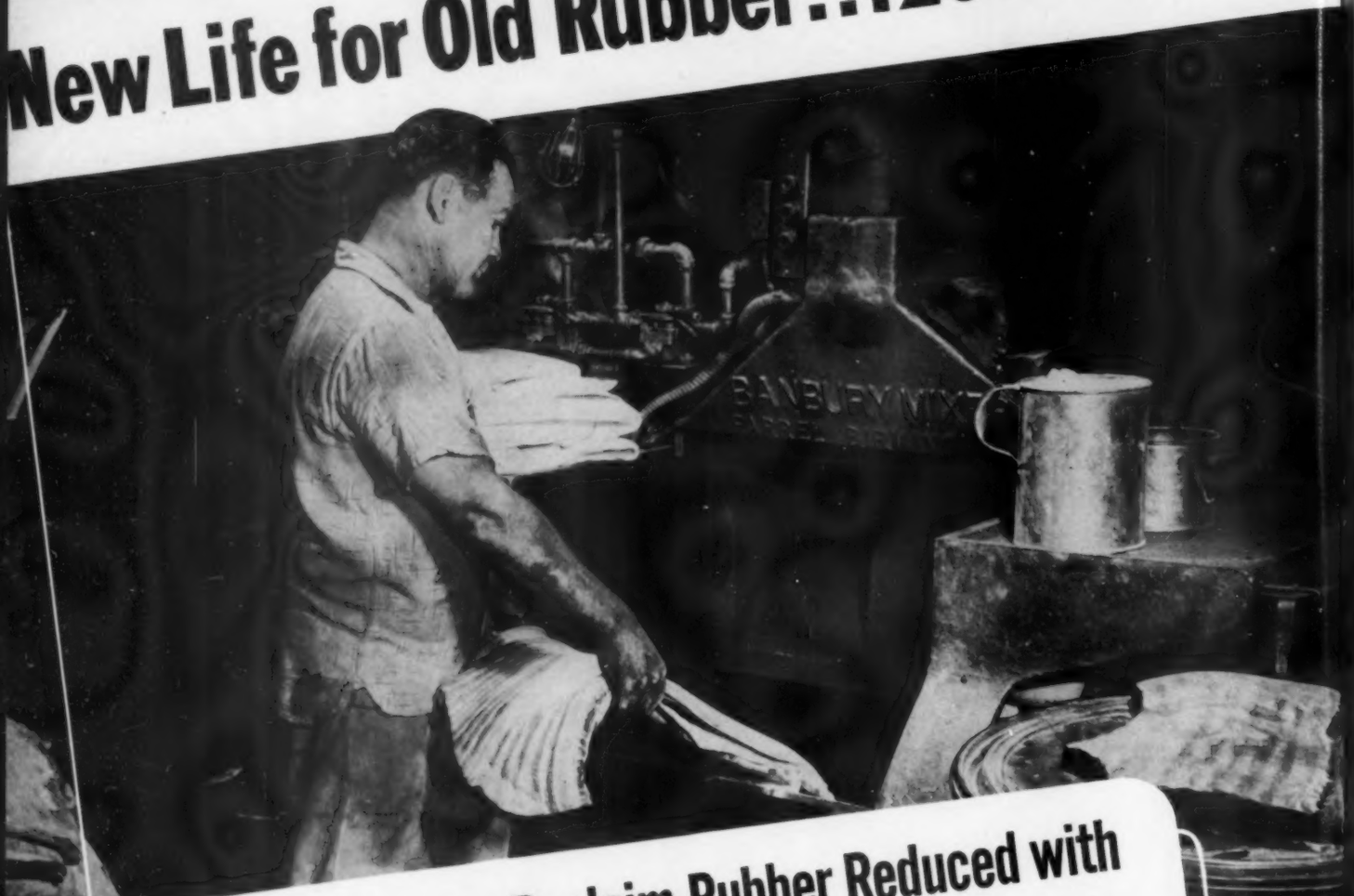

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VOLUME 52
NUMBER 3

CONTENTS FOR DECEMBER, 1942

Synthetic Rubber from Petroleum—*By Gustav Egloff* 221

Accident Frequency Rates in the Rubber Industry 226

Low Temperature Flexing Apparatus—*By S. M. Martin, Jr.* 227

Nullifying Static Electricity in Rugs and Carpets 228

Progress Report No. 1 from the Office of the Rubber Director 229

The Role of Soap in the Rubber Program—*By Georgia Leffingwell and Norman Radin* 235

Abstracts of United States Patents on the Compounding and Use of Synthetic Rubber—*By Frederick Marchionna*.. 237

REGULAR DEPARTMENTS

New Equipment Section	264	Obituaries	261
Book Reviews	266	Los Angeles News	260
Editorial	240	Washington Appointments ..	252
Late Domestic News	241	Rubber, Cotton Markets	270
Financial News	260	Chemical Markets	271
Names in the News	258	Market Place	272
Coming Events	253	Classified Ads	277

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The **RUBBER AGE**

VOL. 52, No. 3 **DECEMBER, 1942**

Synthetic Rubber from Petroleum

By GUSTAV EGLOFF

Director of Research,
Universal Oil Products Co., Chicago, Ill.

The following article by Dr. Egloff, who was recently elected president of the American Institute of Chemists, was delivered at the Third Mid-American Chemurgic Conference of Agriculture, Industry and Science, held under the auspices of the National Farm Chemurgic Council at Cincinnati, Ohio, on November 17 and 18, 1942. Most of the data in the article has appeared at one time or another in the news pages of "Rubber Age," but because it is a good resume of the synthetic rubber situation as it currently exists, we are reproducing the article herewith in full.

AS one engaged in scientific and technical research, I have followed with great interest the progress of Farm Chemurgic to bring about greater application of science to our daily lives, and to the problems in agriculture in particular. My keenest sympathy has been with your efforts to awaken America to the need of utilizing science and technology to improve conditions in agriculture.

That these views have not been held in our country until a short time ago is so much water over the dam. But today I say that the people of the United States not only should not—they must not and need not—ever again be caught in the serious predicament from which we are all suffering: namely, a shortage of rubber which is so vital in our daily lives and to the United Nations at war.

Our economic life has been disrupted due to the fact that over 95 per cent of the world's natural rubber supplies are in the hands of the Japanese.

Ever since the automobile became a major part of our national economy, two factors have been uncontrollable: first, the growing of rubber trees located 10,000 miles away, and second, the actual production of rubber. Automobile and fuel technologists have made an exact science of the operation of the automobile mechanism, but the tires upon which it runs, until the present time, have been dependent upon a temperamental rubber tree and the idiosyncracies of a little brown boy who gathers the rubber latex.

Rubber Needs Doubled

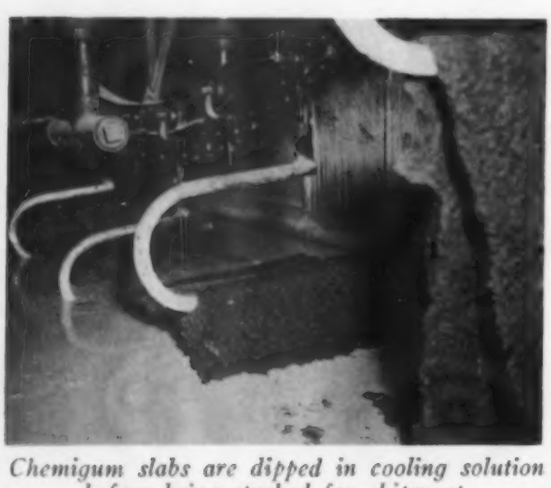
We have been catapulted into a synthetic rubber program with a speed that is hair-raising. The Baruch Committee in September, 1942, recommended that we produce at the rate of 1,106,000 tons of synthetic rubber a year. Our peacetime consumption of natural rubber was about 600,000 tons yearly.

Fortunately, the United States has the raw materials and processes to produce synthetic rubber not alone from petroleum and coal but also from agricultural products. Literally an army of research workers and technologists are to produce synthetic rubber and to continually improve upon its properties at expenditures of millions of dollars yearly.

Out of the researches going on in the United States, new synthetic rubbers will be developed with far superior properties to anything nature or man has ever produced. Even today some synthetic rubbers have special properties and uses for which natural rubber is worthless. Synthetic tires are being developed that give wear properties and safety to human lives not inherent in natural rubber. The life of these tires will be at least several times that of natural rubber. History will again repeat itself as in the case of silk.

Nature's product, natural silk, spun by worms, has been superseded in quality and wear by a substitute silk—Nylon. And, the mileage on milady's Nylon hose is now more than ten times the best product that the silkworm ever produced. The cost of Nylon hose in relation to the natural silk is of the order of one-tenth, at least on a mileage basis. We may look confidently into the future—that rubber tires will go through the same evolution as natural silk to Nylon. Good as the mileage of natural rubber tires is, the synthetic may ultimately reach ten or more times that of nature's product from the rubber tree.

The purpose of this Chemurgic Conference at Cincinnati is, I take it, to contribute if possible to progress in finding industrial uses for products of the farm. I am glad to be here as a representative of the petroleum industry. Without pretending to know much about agriculture, I am convinced nevertheless that the petroleum industry has many points of contact with agriculture, and that the two industries have important interests in common.



Chemigum slabs are dipped in cooling solution before being stacked for shipment.

Customer and Supplier of Agriculture

In its relations with agriculture the petroleum industry has been both customer and supplier. As a customer or a purchaser it has for many years provided the market for a sub-surface crop from the farms of this country. It has been estimated that oil company payments to farmers for oil taken from their lands total about $280,000,000,000 a year.

The petroleum industry has been a purchaser of the products of the land for use as constituents of its products or for supplies in the operation of its processes. In drilling wells, for example, sugar cane bagasse, wheat bran, and cottonseed hulls are among the materials used to plug porous underground formations.

There is not a farm of consequence in the United States which is not visited at frequent intervals by the supply vehicles of the petroleum industry. No other supplying industry is more seriously interested in the farmer's problems and his welfare. No other, if we want to put the discussion on a purely utilitarian basis, stands to benefit more directly from making its services to the farmer worthwhile. The farm industry and the petroleum industry are never going to get very far apart no matter what issues may arise before Congressional Committees and in the press between their separate but co-operating industries. They are not even likely to have any lasting difference over the question of synthetic rubber.

Rationing Cuts Gasoline Sales 30%

The oil industry will lose a major part of its market for gasoline and motor oil through the restrictions which the rubber shortage has caused to be placed upon operations of motor vehicles through gasoline rationing. It is of much greater importance to the oil industry to get that market back than it could possibly be to gain for itself a market for that relatively small quantity of petroleum which will be needed in the manufacture of synthetic rubber.

The rationing of gasoline as proposed will cut down the consumption of gasoline for motor vehicles more than 30 per cent of the total consumed last year—28,000,000,000 gallons—which means a loss of income to the oil industry of over one billion dollars a year, due to the fact that we shall not have sufficient tires to operate the motor vehicles. The oil industry has a vital interest in seeing that cars are provided with tires, and would therefore do everything possible to see synthetic rubber made from alcohol, or coal, or guayule, or any other raw material from which it could be made more quickly than from petroleum.

When the need for synthetic rubber arose so critically following the disaster at Pearl Harbor, the petroleum, rubber and chemical industries were ready to tell the government how to make it. A number of petroleum companies even had small scale commercial and pilot plants in operation producing the necessary raw materials. It was therefore nothing less than a duty for the petroleum industry to place its knowledge at the disposal of the government and to proceed with the erection and operation of commercial scale plants as ordered by the government.

For all practical purposes the controversy as to whether it is best to make synthetic rubber from petroleum or alcohol or other material has been settled by the Baruch Rubber Committee, who have decided that

the plants already agreed upon should proceed according to schedule. They have also given most of the known processes an opportunity to be tried out in ways which will delay as little as possible the actual production of critically needed rubber. As to whether that decision was right, as to whether the emphasis should have been more on alcohol, time and the inexorable facts which will be deduced from actual manufacturing experience will tell. In the meantime, synthetic rubber will be produced.

The petroleum industry will naturally yield to whatever lesson experience teaches. Meanwhile, it will continue to do what is conceived to be its bounden duty by applying the "know how" it has already gained in the building of plants and the production of materials for synthetic rubber as swiftly and efficiently as possible.

Four Kinds of Synthetic Rubber

Natural rubber is made up almost exclusively of carbon and hydrogen in chemical combination, and as far as we know is a multiple of the hydrocarbon called isoprene. Natural rubber may be derived from many types of plants, such as guayule, *cryptostegia*, the sunflower, *kok-sagyz*, goldenrod, milkweed, and a host of others, giving a varying percentage of a latex that can be worked up into rubber. Natural rubber has been known for thousands of years and has been found in the tombs of the ancients.

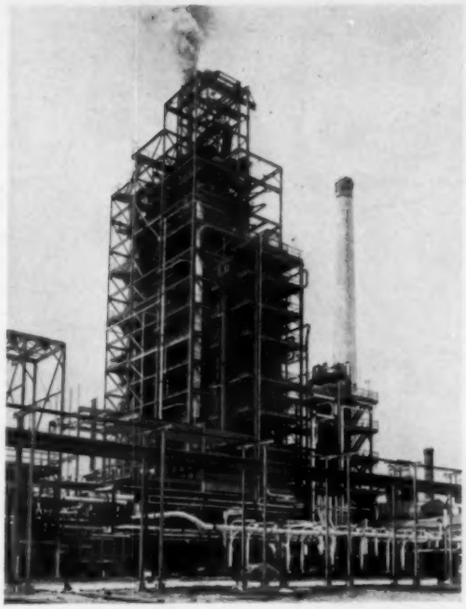
As far as is known, the first rubber trees of moment were those found in Brazil, the botanical name for which is *Hevea brasiliensis*. The seeds of the Brazilian rubber trees were transplanted in the Far East by the British and the Dutch, and huge plantations resulted. The rubber tree is slashed in a herringbone effect and a white material called latex oozes out and is collected, the rubber from which may be gathered by precipitation with mineral acids or burned over a slow fire, which is the native method of recovering rubber.

No successful methods have been derived through chemistry to exactly synthesize natural rubber, which has been the goal for many years. However, out of this mass of researches new types of rubber have been developed which are called "synthetic." These synthetic rubbers have properties many of which are superior to the natural. In this world struggle, to which rubber is so essential for bringing about a successful conclusion, four types of synthetic rubber are in commercial production.

The most important of these synthetic rubbers is the Buna S type, which results from the chemical combination of butadiene and styrene. Commercial units are being installed to produce the Buna S type at the rate of 705,000 tons a year, with another 140,000 recommended.

Another type of rubber called Butyl will be produced at the rate of 132,000 tons a year. Butyl rubber is a result of the reaction of isobutylene (98%) and isoprene (2%). The neoprene type of synthetic rubber is based upon acetylene. Commercial plants for 49,000 tons a year capacity are being installed, with another 20,000 recommended. The production of Thiokol type rubber has been recommended at the rate of 60,000 tons a year.

At present, production of butadiene is scheduled at the rate of 705,000 tons. It will be produced from raw materials as shown in the following table:



Fluid catalytic cracking units of this type are already producing butadiene.

Raw Materials	*Tons Butadiene*
Grain Alcohol	242,000
Butylene	283,000
Butane	66,500
Refinery (Conversion processes)	20,000
Refinery Conversion Processes and Butene Combinations	93,500
	705,000

The Baruch Committee has recommended another 100,000 tons of butadiene to be derived from refinery processes in order to provide the quantity necessary for the increased 140,000 tons of Buna S rubber. Hence, there is a total of 805,000 tons a year of butadiene which will be required for the projected program for synthetic rubber.

Butadiene is the key hydrocarbon in the production of synthetic rubbers. There are over eighty different types of material which under some experimental conditions in the laboratory will produce low and high yields of butadiene. Butadiene was first reported upon by Bouchardat over a hundred years ago when he distilled a natural rubber and obtained butadiene as one of the reaction products.

The conversion of ethyl alcohol into butadiene has been known for over forty years. The reaction was discovered by Dr. V. N. Ipatieff of Universal Oil Products Company. The Russians were the first to use the process commercially, starting in the year 1930, and are reported to be producing at the rate of 100,000 tons a year of butadiene type of synthetic rubber.

35% of Butadiene from Grain Alcohol

One of the commercial processes in the U. S. A. for producing butadiene is from grain alcohol. The present synthetic rubber program will call for about 90,000,000 bushels of grain per year to produce the

242,000 tons of butadiene, about 35% of the butadiene requirement in the rubber program.

One of the primary methods of producing butadiene will be by the catalytic dehydrogenation of butylene. Butylene is a by-product of the thermal and catalytic cracking of oil to produce aviation gasoline. The butylene can also be converted into aviation gasoline by a reaction with isobutane. Only part of the butylene produced in refinery operation will be used for butadiene production. The dehydrogenation of butylene will be at a yearly rate of 283,000 tons.

Butane derived from refinery or natural gas is also a source material for butadiene via catalytic dehydrogenation at high temperatures. The scheduled rate will be 66,500 tons a year.

The oil industry is using existing equipment converted over to the high temperature cracking of petroleum fractions to produce butadiene at temperatures of 1400°F. This reaction may take place in the presence of superheated steam, flue gas or partial oxidation with air to raise the temperature to the cracking point. In addition to butadiene by cracking of gasoline, ethylene, propylene, butylenes, benzol and toluol are produced which are useful in aviation gasoline, high explosives and synthetic rubber manufacture.

German Butadiene from Coal and Limestone

The Germans use coal and limestone, which are converted in electric furnaces to calcium carbide at great electrical energy costs to produce butadiene. The calcium carbide is converted into acetylene by the action of water thereupon. The acetylene is then converted into butadiene through four chemical steps, *i.e.*, acetaldehyde, aldol-condensation product, butylene glycol, and then dehydration to butadiene. Ethyl alcohol seems to pass through a similar set of reactions when dehydrated-dehydrogenated into butadiene.

The Department of Agriculture is experimenting with another source of butadiene derivable from fermentation of grain to the product 2, 3-butylene glycol. This product is then dehydrated to butadiene. It is one of the methods receiving serious consideration.

Another compound that a group are working on to produce butadiene is through butyl alcohol derived from the fermentation of grain. The butyl alcohol is dehydrated into butylene, exactly the same compound as produced from cracking of oils, and then is dehydrogenated into butadiene. It is of interest to point out at this stage that ethyl alcohol is produced from the fermentation of grain through enzyme fermentation of a particular type, whereas butylene glycol requires another type of bacteria, and butyl alcohol still another type. However, all three compounds producible from grain are convertible into butadiene at a price. The price of products of course plays no marked role in a war economy. The important point is speed of production with minimum outlay of strategic materials in the form of copper, chromium, etc.

Another important component of synthetic rubber for Buna S is styrene. Styrene is a hydrocarbon which is a resultant of a reaction between benzol derived from coal and ethylene to form ethylbenzene which is dehydrogenated to styrene. The ethylene used in this reaction may be produced from grain alcohol by dehydration or cracking of hydrocarbons. Commercial plants to produce ethylene from grain alcohol have been proposed for the production of ethylene. The oil industry has proposed an ethylbenzene process for the rubber program from the direct reaction of grain alcohol and benzene using a solid phosphoric acid catalyst. The latter when spent may be used as a fertilizer.

When butadiene (75%) and styrene (25%) are mixed together in the presence of a catalyst, a solid product, Buna S type of rubber, results.

Butyl Rubber All from Petroleum

Butyl rubber, a development of the oil industry, is a highly important contribution to the war effort. Isobutylene (98%) is the key hydrocarbon which reacts with isoprene (2%) to produce Butyl rubber. The isobutylene and isoprene are produced from petroleum. The isoprene is exactly the same hydrocarbon which is derived from natural rubber when distilling it at elevated temperatures. The rubber decomposes into primarily the hydrocarbon isoprene. The isobutylene is derived from thermal or catalytic cracking of petroleum. Butyl rubber will be used for necessary civilian war production, transportation, etc.

Another type of synthetic rubber called Thiokol is produced by chlorination of ethylene, which is then thoroughly agitated with sodium polysulfide. The ethylene for this reaction may also be produced from the cracking of petroleum or by the dehydration of grain alcohol. Hydrogen sulfide is present in varying percentages of natural or refinery gases and may be readily converted into sulfur. This sulfur is then reacted with caustic soda to produce sodium polysulfide. After reacting ethylene with chlorine, the dichloroethane formed reacts with the polysulfide yielding Thiokol.

A hydrocarbon of the greatest import is acetylene, which is used in the production of the synthetic rubber called neoprene. Acetylene is also the base material for Nylon, a substitute for natural silk. Acetylene is produced from coal and lime via the calcium carbide production in electric furnaces requiring a great deal of electrical power, of which the nation is short. Acetylene when treated with hydrochloric acid and a catalyst forms neoprene.

It is therefore of importance to advise that acetylene is to be produced commercially under very high temperatures from petroleum or natural gas. Two commercial acetylene units are being installed, one of which will produce at the rate of 27,000 tons a year of acetylene. Other units are also projected.

A synthetic rubber named Buna N, or Perbunan, is being produced commercially by private capital. This type of rubber has many specialized important uses. It is produced from the reaction of butadiene and acrylonitrile in the presence of a catalyst. The acrylonitrile component is also readily made from natural gas or petroleum.

In fabricating a rubber tire, whether synthetic or natural, one of the important components is carbon black or furnace black, which is producible from natural gas, and petroleum. These carbonaceous materials are important components whether blended with natural or synthetic rubber, particularly from the standpoint of improving the tensile strength and wearing qualities under service conditions of the tire.

In the year 1940 about 369,000,000,000 cubic feet of natural gas were converted into carbon black by the air-oxidation method using the so-called channel process. This volume of natural gas yielded about 285,-

000 tons of carbon black, of which 85 per cent was used in tires. As far as tests are concerned, furnace black appears to be a superior type of carbon for use in synthetic tires.

Natural vs. Synthetic Tires

The approximate composition of natural and synthetic tires, which vary as a function of the type of use intended, *i.e.*, treads and carcasses, is shown in Table I.

It is of importance to note that about one-third of the total weight of the tire—30 to 35 per cent—is made of cotton. When the total weight of tires fabricated in the United States is considered, the amount of cotton required for their manufacture is considerable. Rayon yarns have also been used in tire fabrication with good results.

The world's natural rubber production for 1941 was about 1,675,000 long tons, of which the United States imported something over 800,000 tons. Ninety-five per cent of the world's natural rubber sources have been lost to the United Nations. Russia lost two of her synthetic rubber plants in the Ukraine. Airplanes, tanks, trucks, ships, trains, gun mountings, and so on, require rubber in ever-increasing amounts, and this does not include the necessary increase for civilian uses in the war effort.

Some of the tires used by the Army weigh over 3500 pounds. A medium size tank requires 500 lbs., small pontoon bridges 1000 lbs., and the gasoline tank of a flying fortress requires 500 lbs. of a bullet-sealing type of rubber. A battleship calls for from 75,000 to 150,000 pounds of rubber, and a gas mask ¾ of a pound.

There are many hundreds of products that require rubber in the war effort. These are barrage balloons, blimps, rafts, life vests and suits for flyers, rubber boats and hospital rubber needs. Rubber is required also in one form or another by the many millions of men on the fighting fronts.

U. S. Arsenal for Allies' Rubber

Preparations to make synthetic rubber in the U. S. at a rate of 886,000 tons a year, involving plant costs of about $800,000,000, are already under way. The Baruch Committee has recommended that this tonnage be increased to 1,106,000 tons a year. In addition to being the arsenal for many other war products, synthetic rubber will also have to come from the United States to supply our allies' needs. It may well be assumed that even 1,106,000 tons of synthetic rubber will be too low for the United Nations' requirements.

As has been said before, the synthetic product does not attempt to duplicate the natural in any way. In general, it can be said, however, that some synthetic rubbers are at least equivalent to the natural product, and it is certain that many properties have been enhanced through research on synthetic rubber, since the product is superior in gasoline, oil and chemical resistance. It is also more stable to light and air and has greater wearing properties. Tests with synthetic rubber tires have shown that the synthetic tired vehicle goes uphill with very little side-slipping, and when operating the car on curves at high speeds the synthetic tire is safer than the natural.

With the large number of research men in the field of synthetic rubber and with expenditures of millions of dollars yearly, it can well be predicted that synthetic rubber tires will evolve with a life at least equal to that of the motor car. In many instances, the synthetic rubber industry might well be likened to the production of other synthetic products which occurred during the first World War, the most notable of these being the production of synthetic nitrates from the air.

For many years the Chilean nitrate deposits were the only ones worthy of note throughout the world, and the owners operated a virtual monopoly of these resources. As in the case of rubber, it was necessary to start with the materials indigenous to the United States. Since the conclusion of the first World War the Chilean nitrate deposits have not been worked on the same scale as before. It might well be that the natural rubber plantations will enter the same sort of period as the nitrate deposits.

TABLE 1

Natural Rubber Tire

Tread	*Parts*
Smoked sheet	100.
Carbon black	50.
Zinc oxide	5.
Sulfur	3.
Stearic acid	3.
Pine tar	4.
Accelerator (Captax)	1.
Antioxidant	1.
Cure: 60 min. @ 30 lbs. or 45 min. @ 40 lbs.	
Carcass	
Smoked sheet	100.
Zinc oxide	5.
Sulfur	3.
Stearic acid	1.
Pine tar	4.
Accelerator	0.8
Antioxidant	1-1.5
Cure: 60 min. @ 30 lbs.	
Truck Tire Carcass	
Same as above except that 50 parts of zinc oxide are used instead of 5.	
Cotton Yarns	
Fabric is roughly 30 to 35% of the total weight.	

Synthetic Rubber Tire (Buna S Type)

Tread	*Parts*
Buna S	100.
Carbon Black*	50.
Zinc oxide	5.
Stearic Acid	2.
Softener**	5.
Captax or Santocure	1.5
Sulfur	2.
Carcass	
Buna S	100.
Soft carbon black***	40.
Zinc Oxide	5.
Softener	15.
Captax	1.5
Sulfur	2.

*Softer type of black. **Rosin or coal tar oils, BRT #7. ***May be 30 to 40 parts, such as P-33 or a blend of channel black (20) and P-33 (20); or 20 parts in all may be used, 10 of soft black and 10 of channel black.

100,000 Miles Per Tire

One may well ask the question why the Rubber Reserve Company production capacity schedule has emphasized the Buna S and Butyl types of synthetic rubber. This is readily understandable due to the fact that the oil industry knew how to produce these products and had the raw materials available, as well as the "know how." So the oil industry went ahead and accepted the responsibility of producing the raw materials for these two type rubbers. The Butyl type is solely a development of the Standard Oil Company of New Jersey, and is a 100 per cent American process.

The oil industry also had the "know how" of producing the raw materials for the Buna S type. The agricultural division of our economic life has also fitted into the picture of producing butadiene and ethylene.

The costs involved in producing synthetic rubber of the Buna S type will ultimately work on a mass production basis to be less than 15c per pound. When one takes into account the increased wear (100,000 miles per tire) and safety properties that will be present in synthetic tires based on continued research, cheaper raw materials and processing costs on a relative basis, the synthetic rubber will be substantially cheaper than the natural. As of today, as far as the World War is concerned, the cost of synthetic rubber is relatively unimportant. However, what is really important is the saving of critical materials and the high speed of getting on the production line—that is what counts, and should be the primary determining factor in having rubber for every war need quickly.

It is not now a question of being concerned about the post-war, for that period will in our competitive system come to the processes which are most economic. Grain alcohol or any other products from agriculture should be used to the maximum of their capacity at present wherever to do so will speed up the war effort toward a successful conclusion for the United Nations.

Out of this World War will flow some good—certainly as it relates to synthetic rubber from the standpoint of greater safety in motor vehicle, travel, etc. One may be certain that, good as synthetic rubber is today, it will be far surpassed by that yet to come with the thousands of research men experimenting continually on this problem. Natural rubber will go the way of the silkworm, of natural nitrates, indigo, quinine, and other natural products which man has superseded by synthetics. It must be understood that synthetic products means, not inferiority but on the contrary, in general may be vastly superior to the natural. There can be no doubt that with intensification of research men in agriculture new uses, new products, will flow from the scientists working in their laboratories and technologists working to convert the laboratory research into something useful to mankind.

After the war the manufacture of synthetic rubber will be a major industry capable of supplying the entire country with products meeting its every need. Whether the raw materials come from petroleum, coal or alcohol still remains to be worked out during an economy not based on war. Should alcohol become the major source the petroleum industry will co-operate in every way possible as has been done in the past. Should the petroleum industry continue in its present role of the chief raw material supplier for synthetic rubber, it will serve in that respect as it has served in supplying other petroleum products to be a chief assistant in making agriculture easier, more fruitful, and more profitable.

It is the deep wish of the oil industry to see the agricultural industry prosperous and to see many new uses develop from its products. The government has many laboratories engaged in problems of agriculture. May they work out processes of great usefulness to all of us.

Accident Frequency Rates in the Rubber Industry

ACCIDENT frequency rates in the annual contest for rubber manufacturing plants sponsored by the Rubber Section of the National Safety Council, were up 12 per cent during the 1941-42 contest, according to a recent report made by the Council.

The "large plants" group had the lowest rates. They averaged 6.49 reportable accidents per 1,000,000 man-hours worked, in comparison with 8.13 for the "small plants" group of the contest.

The large plants also had the best results in comparison with the previous contest—an increase of 11 per cent, while the increase in the smaller plants averaged 30 per cent higher.

Van Cleef Brothers, Chicago, worked the largest number of man-hours without a reportable injury. Five other plants also had perfect records, but worked a lower total of man-hours in compiling their records.

The average accident frequency rates for all contestants in both contest groups was 6.57.

The winners were:

Large Plants: (1) United States Rubber Co., Indianapolis Plant—frequency rate, 0.85; (2) Ball-Band Plant, Mishawaka, Ind., accident frequency rate, 0.97; (3) United States Rubber Co., Naugatuck Footwear Plant, Naugatuck, Conn., accident frequency rate, 1.13.

Small Plants: Van Cleef Brothers, Chicago; United States Rubber Co., General Development Department, Passaic, N. J.; Collyer Insulated Wire Co., Inc., Providence, R. I.; Canadian Lastex, Ltd., Montreal; The Lobl Manufacturing Co., Middleboro, Mass.; Fabric Fire Hose Co., Sandy Hook, Conn.—each of which had a perfect accident-free record for the contest year.

EDITOR'S NOTE: Because exact man-hour totals for the thousands of plants which report to the National Safety Council would provide reasonably accurate yardsticks of production, this information has not been included in the above report. It will probably be made available at the end of the war.

Low Temperature Flexing Apparatus

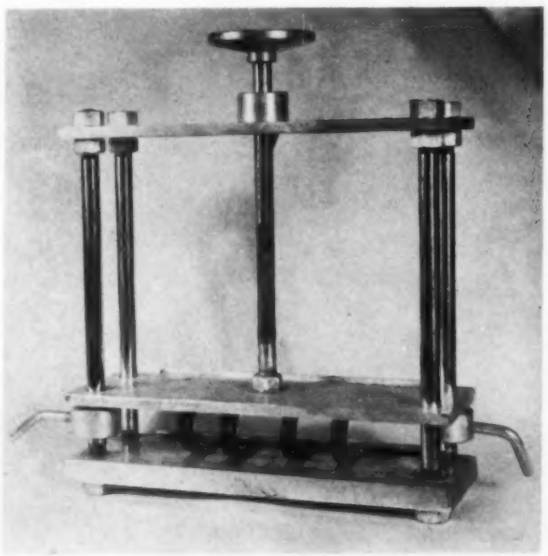
By S. M. MARTIN, Jr.

Development Manager,
Thiokol Corp., Trenton, N. J.

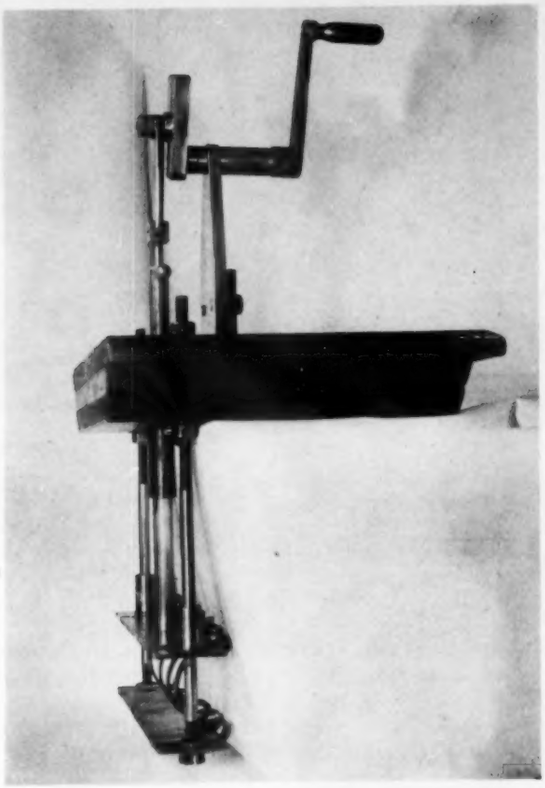
FOR the past ten months, Sub-Committee V of SAE - ASTM Technical Committee A on Automotive Rubber has been working on the standardization of synthetic rubber specifications. Insofar as possible, methods of tests have followed ASTM procedures. ASTM has no recommended procedure for measuring the low temperature flexibility of synthetic rubber. This committee, after careful consideration, has recommended the use of a modification of the Thiokol Corporation's Freeze Test. This method of testing for low temperature flexibility has been incorporated into a number of recent Aeronautical Material Standards Specifications covering synthetic rubber.

The modified test uses the same apparatus as used in the Thiokol Corporation's Laboratory, or slight modifications of this. Because of the interest in this apparatus, a short description of it is here given.

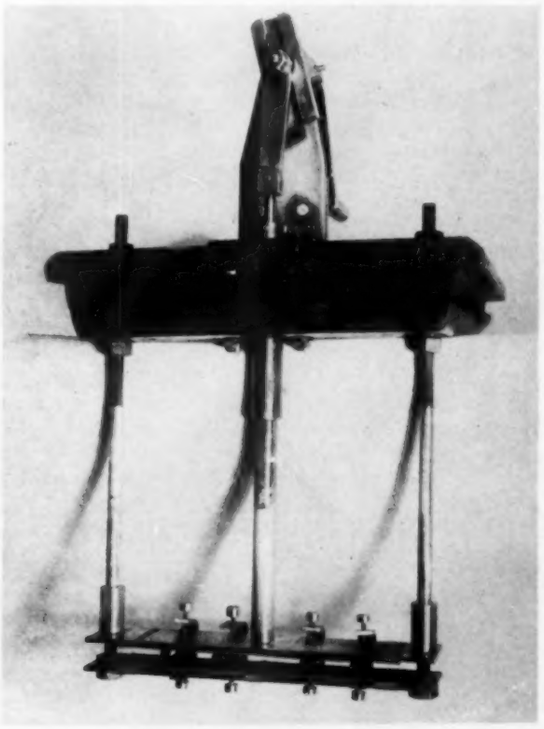
The instrument and its operation can best be understood from the accompanying photographs. The picture shows the instrument as mounted on the top of the



A modification of the Thiokol apparatus as used in the Chrysler Laboratories.



Samples mounted in the apparatus with plates apart preparatory to flexing.



The same samples under maximum bend with the plates together.

cold box. This has been removed from the box for the purpose of photographing. The principle of the test is based on bending the samples between two parallel plates. By controlling the minimum distance between the plates at the time of maximum bend, the sample can be given most any desired radius of bend. By turning the crank, the samples are flexed. Whether the crank is turned a half revolution, a whole revolution, or several revolutions, depends on the prescribed conditions set up for the test.

The sample, which is usually in the form of a strip 4" x 0.25" x 0.60", is mounted between plates 2½" apart to form a loop. The plates should be sufficiently wide (*i.e.*, 2" to 2½") so that the bend in the test piece doesn't protrude beyond the edge when the plates are brought together.

When the samples have been properly conditioned at the low temperature, the samples are flexed by simply turning the crank.

The apparatus is very simple and exceedingly flexible. It allows numerous adjustments as to the amount of bend given the sample, and also the number of bends.

A number of these instruments have been made without the crank. Here the movement is activated by pushing down on a rod attached to the top plate.

A modification as used in the Chrysler Laboratories is shown in an accompanying photograph.

Nullifying Static Electricity in Rugs and Carpets

AN INTERESTING method of weaving rugs and carpets so as to nullify static electricity accumulation was recently patented in England by the United States Rubber Co. American patents on the method are pending. The development, in brief, provides for the interweaving of a conductive yarn throughout the pile and backing of the carpet which runs into a rubber composition-treated backing that absorbs the static electricity generated through friction.

This type of carpeting, according to U. S. Rubber, has been in use for more than a year on two floors of the Hotel Pennsylvania in New York City with successful results. Arrangements were under way for the manufacture of floor coverings employing the new method when war restrictions interfered to prohibit the use of essential materials. At present there is no activity in the carpet industry on the new development, nor is any such activity anticipated until the release of rubber compositions which are needed.

The development, nevertheless, is of considerable importance and accordingly we are reproducing a description of the process below as it appeared in a recent issue of one of the British textile journals. The description follows:

It is recognized that as a person walks on a pile rug there is likelihood of a resulting accumulation of static electricity in or on the body and that this accumulation of electricity is discharged when the person touches an electrically conducting body. In some cases the amount of static generated reaches such proportions as to be definitely objectionable. In any event, this static generating condition is always a source of annoyance, and its effect on different people varies in accordance with the temperament of the particular individual. Static generated from rugs is usually increased as the relative humidity is decreased, thus accounting for the more noticeable effect of static during the winter months.

This invention provides a pile fabric covering having electrically conducting elements extending from the top to the underside of the rug, in combination with electrically conducting means located at the under side of the rug for the purpose of dissipating a static charge.

Among the objects of the invention are to provide a pile rug having static dissipating characteristics for the purpose of eliminating the annoyance of static shock; to provide in such a rug an electrically conducting means which is resilient, and which does not detract from the appearance of the rug; and to provide conducting means which may be incorporated with pile rugs efficiently and economically.

To provide an electrically conducting medium extending from at least occasional points at the top surface of the rug to a point located at the under side of the backing, there is provided a cord, yarn or thread, treated to make it electrically conducting, in the rug. The cord, which may be formed of cotton or other material, is threaded through the rug and along the under side of the backing and again upward to the top surface of the nap or pile. The ends of the treated cord preferably terminate at the top surface of the rug as formed by the nap. The exposed ends are preferably about two inches apart, although good results have been obtained by spacing the cord ends four or more inches apart.

After the cords are drawn through the thickness of the rug, the under side of the rug is treated to render it electrically conducting. For this purpose a coating of a rubber composition containing electrically conducting carbon black is applied to the under side of the backing.

As the cords are exposed at the under side of the backing, they engage with the layer of conducting rubber on the backing and an electrical connection is formed there between. By this arrangement static electricity which is generated on or in a body passing over the top of the rug, which body forms a contact with one or more of the cords, passes through the treated cords and becomes dissipated in the layer of conducting rubber. The cords do not of themselves dissipate a static charge unless they engage with the conducting medium underlying the rug and having a capacity sufficiently great to absorb the electrical charge.

The layer of conducting rubber composition functions as a condenser and has a sufficiently great capacity to receive and then dissipate accumulation of static by leakage. By spacing the conducting elements or cords throughout the area of the rug, the static is not only discharged from the body contacting the rug, but no substantial accumulation of static is possible because of the frequent displacement of the conducting elements which pass through the rug.

Progress Report No. 1 from the Office of the Rubber Director

On November 30, 1942, William M. Jeffers, who was appointed Rubber Director of the United States by President Roosevelt on September 15, 1942, submitted his first progress report to Donald M. Nelson, chairman of the War Production Board. This report covers the work of the Office of the Rubber Director and the principal problems and situations confronting the Office as of the date of submittal of the report. Because of the need to make clear to the rubber industry, as well as to the public, the present status of the rubber program, Mr. Jeffers requested permission to distribute the report and we are glad to cooperate by publishing it in full herewith.—Editor.

IN stating the problem, the "Report of the Rubber Survey Committee" dated September 10, 1942, said:

"Of all critical and strategic materials, rubber is the one which presents the greatest threat to the safety of our nation and the success of the Allied cause. Production of steel, copper, aluminum, alloys or aviation gasoline may be inadequate to prosecute the war as rapidly and effectively as we could wish, but at the worst we are still assured of sufficient supplies of these items to operate our armed forces on a very powerful scale. But if we fail to secure quickly a large new rubber supply, our war effort and our domestic economy both will collapse. Thus the rubber situation gives rise to our most critical problem."

It then established the rubber program and interspersed with clearly stated reasons, made many definite recommendations.

In accordance with presidential executive order of September 17, 1942, the Chairman of the War Production Board appointed me Rubber Director, delegated to me the powers enumerated therein, and delivered to me a copy of a letter from the President. From this I quote the following two sentences: *"I want to carry out the recommendations in the Baruch Report as fully as possible.* * * * One of the main jobs is to start the mileage rationing program as quickly as possible."

In harmony with the spirit of the Baruch Report, I have staffed my organization with men who are by training and experience preeminently qualified to direct and execute the work of the major subdivisions of the problems entrusted to me. My first order to them was, in the absence of special and approved contrary reasons, to carry out the recommendations stated or implied in the Baruch Report. Because of this most of the remainder of this Report takes up the work of the various subdivisions of my organization by describing the present status of those recommendations which it is their respective duties to effectuate. The subdivisions so treated are:

(1) Executive functions incident to policies, programming and reports; and the direction of work carried out under directives from me by the Rubber Reserve Company, Defense Plant Corporation, the Board of Economic Warfare, Office of the Petroleum Coordinator, Office of Defense Transportation, Office of Price Administration, the Department of Agriculture and others.

(2) Supervision of problems incident to plant construction and priorities therefor.

(3) Operations pertaining to the rubber industry, statistics, allocations, requirements and schedules, priorities, reclaiming of scrap, recapping and retreading of tires, etc.

(4) The technology and specifications for industry uses of various natural rubbers, synthetic rubbers, rubber substitutes and reclaims.

(5) Research on and development of synthetic rubbers, new ideas and inventions. This Section is charged with the duty of arranging for the coordinating research on mechanisms of polymerization, as well as the development and engineering of processes, and the piloting of new developments.

(6) Research on and development of processes for the manufacture of raw materials other than those made by processes whose development has been entrusted to other Governmental agencies.

Of the above, the first is directed by me and my deputy, and the remainder by Assistant Deputy Rubber Directors.

PROGRAM

The program of this Office cannot be stated better than in the Baruch Report where it said:

"We must supply not only the needs of our armed forces but most of those of the military machines of our Allies as well. We must equip our buses and trucks and other commercial vehicles and provide on a large scale specialty items for such purposes as factory belting, surgical, hospital and health supplies. And in addition to all these, we must maintain the tires on *at least* a substantial portion of our 27,000,000 civilian passenger automobiles."

To meet this program necessitates a statement as to our requirements, estimates of our inventory situation, and information as to our ability to bring into production enough Buna S and other synthetic rubbers during 1943 to see us through that critical year.

The Baruch Report estimated that requirements of natural and/or synthetic rubber for 1943-1944 would be approximately as follows:

Total requirements of natural and/or synthetic rubbers (in terms of natural) are estimated as follows:

[In thousands of long tons]

	1943	1944
Military	325	325
Private transportation	3	3
Commercial vehicles	59	85
Other civilian uses	49	50
Foreign countries	117	103
British deficiency	24	106
Total	577	672

The Baruch Report also definitely established that we cannot be permitted to reduce our domestic inventory of rubber stocks below 120,000 tons *at any time*. In determining a figure of 120,000 tons as an irreducible minimum, the Baruch Report stated that 50,000 tons thereof would represent a 30-day inventory for American manufacturers; 4,000 tons would be inventory for Canadian manufacturers, and at least 66,000 tons should be considered as necessary inventory on hand in Great Britain to protect against interruption of Atlantic transportation. They went on to state that at least 100,000 tons of this reserve should be kept in the form of crude to protect those requirements of the military which can only be met by the use of crude.

This office believes that their findings were if anything too low and that it would be hard to operate 1,200 American rubber plants with a 30-day over-all inventory at a time when they are converting from the use of crude to the use of Buna S, Neoprene, Thiokol, Butyl, plus several grades of reclaim and several substitutes. This is especially true at a time when transportation facilities are already overcrowded.

Present indications are that our domestic accumulated inventory of crude and synthetic rubber (expressed in terms of crude) at the end of this year, 1942, may approximate 400,000 long tons. If it were not for other programs over which we have no control it seems probable that the accumulated production of synthetic and imports of crude rubber (expressed in terms of crude rubber) might be as much as 175,000 tons by September 30, 1943, and 390,000 tons by the end of 1943. The controlling conditions for these production estimates for 1943 are:

(a) Our ability to secure adequate priorities and proper allocations of fabricated components;

(b) Our ability to complete synthetic plant facilities on schedule; and

(c) The rate at which they come up to full production.

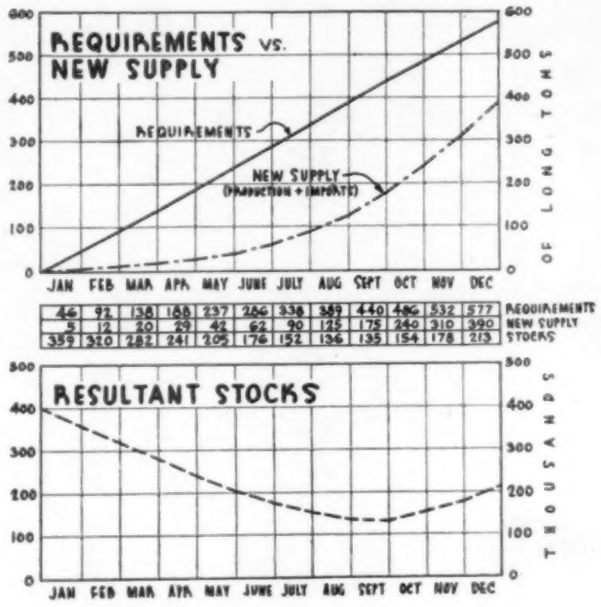
The foregoing is shown graphically in more detail on the accompanying chart. From it, it is obvious that *even if* these production objectives (175,000 tons and 390,000 tons respectively) are attained the inventory *of crude and synthetic rubber in the fall of 1943 will, to all practical purposes, be down to the absolute dangerous inventory dead-line of 120,000 tons*, and by the end of 1943 will have been built up to only 175,000 tons.

From the chart and explanatory notes, it is clear that there is every necessity for continuing through the critical fall of 1943 a policy of rigid conservation of rubber, and that we must envisage the possibility of a complete exhaustion at that time of even so-called normal inventories of finished products. In fact, a delay of a month in the part of the program which includes plants that should be finished by May 30 would mean the loss of 40,000 to 50,000 tons, at a time when there will be none to lose. Present indications are that the impact of competitive programs will cause a delay. It is too early to say how much of a delay.

A scheduling mechanism, now being put into effect, may solve part of the problem and the Office of the Vice Chairman in Charge of Program Determination of W. P. B. is cooperating with us. Nevertheless, I am informed that, although the only sure solution of the Rubber problem is to subordinate other important programs to it, the demands of the Services make this impossible. This is in direct conflict with my understanding and conviction that the President's Executive

1943 U. S. Supply of Rubber vs. Essential Requirements

(In Thousands of Long Tons of Crude and/or Synthetic—in Terms of Equivalent Crude)


REQUIREMENTS VS. NEW SUPPLY
REQUIREMENTS
NEW SUPPLY (PRODUCTION + IMPORTS)
THOUSANDS OF LONG TONS
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC
46 92 138 188 237 286 338 389 440 486 532 577 REQUIREMENTS
5 12 20 29 42 62 90 125 175 240 310 390 NEW SUPPLY
359 320 282 241 205 176 152 136 135 154 178 213 STOCKS
RESULTANT STOCKS
THOUSANDS
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

Notes: (1) Reclaimed rubber and Buna N not included. (2) All data are on a cumulative basis. (3) Resultant stocks obtained by subtracting difference between requirements and supply from initial stocks of 400,000 tons. (4) See "Explanatory Notes" in accompanying box. (5) This chart was prepared by the Office of the Rubber Director and is based on estimates of November 25, 1942.

Order of September 17, 1942 and its accompanying letter endorsed unequivocally the Baruch Report, its program and its statement, "Thus the rubber situation gives rise to our most critical problem."

PROGRAM EXPANSION

The Baruch Committee recommended certain plant expansion. New plants to provide the desired increase in Neoprene and Thiokol capacity are being started. Currently, existing copolymerizing plants promise to provide the required capacity in that direction. However, shortages of raw materials will forbid running these to even rated capacity for another year; hence, no further copolymerizing plants will be started for another six months.

Final arrangements have been made for a portion of the recommended 100,000 tons a year additional capacity of Butadiene from refinery conversions. Engineering work, together with pilot studies, will permit completing arrangements for the remaining capacity as rapidly as necessary critical materials can be obtained without disrupting other phases of the construction program.

The Baruch Report recommended the erection in grain-producing states (preferably accessible to water transportation) of facilities for the manufacture of 100,000,000 gallons per year more alcohol than was then contemplated by the Chemicals Branch of the War Production Board. In making this recommendation,

Explanatory Notes to Chart

REQUIREMENTS

Essential requirements from Table II, page 28, Baruch Report, adjusted to latest quarterly requirement pattern. Therefore, do not include Buna N or *reclaim* here or in supply.

SUPPLY

1. *Imports* reflect possible difficulties in exploitation of new areas, lack of equivalency to plantation crude, possible sinkings and/or disorganized transportation as well as shrinkage of wild rubber in washing and drying. They are estimated at 3,000 long tons per month.

2. *Synthetic Production* estimated for Butyl, Neoprene, and Thiokol and Buna S after deducting for Butadiene a 60-ton plant inventory and for Styrene a 30-ton plant inventory, plus transportation and in process allowances for both of these products of two weeks up to September 1st and one week thereafter. Production estimates based upon no production for first and second units at same location until second month following earliest possible plant completion date; for third and fourth units production starts month following plant completion date—Butadiene and Styrene at rate of 20% first productive month; 40% second; 60% third; and 100% thereafter. Butyl, Neoprene, and Thiokol at rate of 40% capacity first productive month; 75% second; and 100% thereafter. Copolymer production estimates the same basis as third and fourth units and according to Butadiene and Styrene rates up to September 1st and Butyl production rates thereafter. Butyl and Neoprene expressed in terms of equivalent crude by assuming nonwear usage and multiplying production by utility factor. Buna S and Thiokol expressed in terms of equivalent crude by assuming nonwear usage and multiplying production by utility factor. Buna S and Thiokol expressed in terms of equivalent crude by assuming wear usage and multiplying by use factor.

INITIAL STOCKS

Stocks at beginning of 1943 assumed to approximate 400,000 long tons. This estimated from October 1, 1942, inventories and estimates of imports, essential requirements and small synthetic production during last quarter of 1942.

they had in mind that plants being erected to make from alcohol the Butadiene for 242,000 long tons per year of Buna S might run at enough higher than rated capacity to utilize most of this additional alcohol. Furthermore, they emphasized that there must be enough alcohol to preclude the possibility of increased demands from smokeless powder and other munitions industries diverting alcohol from the rubber program.

After all, far more of the country's industrial alcohol is used for other military and civilian purposes than is required for the rubber program.

The Chemicals Branch of the War Production Board has been directed to provide these additional facilities for alcohol production, and has been given estimates of the quantities of alcohol that the butadiene and styrene plants now under construction could consume during the period estimated as necessary for the building of new alcohol producing facilities. The Chemicals Branch states that present facilities and stocks are such that, with present anticipated needs of alcohol, there is no reason for them to expedite the new facilities at the expense of the plants now under construction. They assure us that these new facilities will be available before the plants to consume the alcohol are operating at capacity.

Plans for building plants to make an additional 30,000 tons per year of Buna S from butadiene made from grain are being studied by my technical staff. It is expected that their studies will be sufficiently complete to permit building these as soon as possible after adequate piloting of the processes which the Baruch Committee recommended investigating. This step must also depend on avoiding serious conflict with the flow of materials to plants now under construction for our program.

The recommendation that additional styrene capacity be ready by January 1, 1944, to balance upwards the increased annual production of Buna S, is being watched. But, since, because of lack of materials, the construction of the butadiene plants in the main program is behind that envisioned by the Baruch Report, decision upon this increased capacity has been postponed.

RUSSIA

The Baruch Report stressed the importance of promptly securing detailed technical information concerning the successful manufacture of synthetic rubber in Soviet Russia. This office immediately accepted the offer of the Soviet Republic to make complete disclosure and selected a small group of competent and technically qualified experts to proceed to Russia and report on all phases of this operation. This group has been assured complete cooperation by our Russian Allies and a similar group from the Soviet will come to this country to study our methods and receive reports on our research and technical developments.

NEED OF INFORMING THE PUBLIC

There is still a pronounced lack of public understanding of the rubber situation.

Many do not yet understand that it is essential to our war effort and a prime duty of the Rubber Director to keep on the roads that portion of our essential transportation system which is dependent on our public and private motor vehicles.

They do not understand the vital importance of making their present tires last, nor do they comprehend the sacrifices in convenience driving and pleasure driving which must be made, if each man's own car is to continue at his own disposal for the essential driving our whole war economy demands.

In much of the newly rationed area, they do not fully understand that gas rationing is undertaken solely to conserve rubber. In many sections they resent gas rationing and will continue to resent it, and oppose it, until they have been made to see that less gas means less driving; that less driving means the preservation of their own tires for their own use against that period sometime in 1944 when further supplies of rubber should become available for civilian tires. Only when this rubber is available can rationing be relaxed.

In brief, the public does not yet understand that the vast majority of our motor vehicles must run from now until mid-1944 on the tires now in use, nor that they share with the Rubber Director the duty of each keeping his own car in useful operation. On the contrary, a large part of the public have been led to believe that certain regulations for the control of tire supply insure that on December 1, tires of one or another kind (or recaps) will become available to all who need them.

The need of more information to the public in these points, as well as on such related subjects as the means of tire-preservation, limitation of driving speed, and share-the-car arrangements are self-evident. To obtain the public support, it will be necessary to find a way by which the OPA, ODT and OCS will all spread

a uniform message. This message must be dictated by the Rubber Director.

If confusion can be disposed of and the public is made to realize that rationing is for their own protection and comfort as well as for the war effort, much will have been accomplished toward insuring the rubber program. Unless this is done, publicity stemming from a multiplicity of agencies will cause further confusion and will preclude the possibility of willing acceptance by the public of rationing and of cooperation in other phases of the program which are essential to success.

BASIC POLICY DECISIONS

Though there is no necessity to dwell upon the individual decisions incident to acceptance of many of the recommendations of the Baruch Report, the following are worthy of comment:

The Committee emphasized that there must be an improvement in the supply of materials to plant and equipment fabricators. They made it clear that without such a change, insufficient rubber would be produced in 1943. We have found the shortages to be in fabricated components (such as instruments, forgings, valves, heat exchangers, etc.), more than in materials. Our studies have emphasized that unless these components for synthetic rubber manufacturing plants reach the plants as rapidly as they can be installed the resultant delay will cause such a drain on the crude rubber stocks that there may be no crude left for heavy-duty tires, self-sealing gasoline tanks, and those other military uses which demand crude rubber. The decision as to whether this can be accomplished without too serious delay is in the hands of those who have also to consider other programs, including the program for the building of plants producing high-octane gasoline. Some of these call for the same critical materials. The final solution is not yet developed. The rubber program is receiving notable help in obtaining priorities and critical materials. But its relationship to other programs endangers its completion in time to avoid a crisis and I am not hopeful.

The Baruch Report envisioned the possible desirability of implementing the Rubber Director's Office with funds for carrying out its own work, as well as for some of the work now done by other agencies. As yet, there has been no necessity to request these.

RUBBER RESERVE COMPANY

To aid the flow of materials and to facilitate obtaining priorities, an Assistant Deputy Director has taken over from Rubber Reserve the direction of plant construction.

We have also taken over from Rubber Reserve, under another Assistant Deputy Director, the direction of research, engineering development, and piloting of processes for the manufacture of synthetic rubber and its raw materials. However, we have been careful to leave with Rubber Reserve their technical staff necessary for the control of the quality of raw materials and finished products for and from Government-owned plants under contract with them. In accordance with the Baruch Committee recommendation, Rubber Reserve is arranging for three of the standard copolymerization plants to be run by groups of smaller companies, and arrangements have been made to relax the secrecy provisions of certain of their contracts so that progress shall not be hindered.

BOARD OF ECONOMIC WARFARE

Arrangements have been made with the Board of Economic Warfare for a joint committee to visit Haiti to study the possibilities of obtaining rubber from cryptostegia. They are now on the ground.

OFFICE OF PETROLEUM COORDINATOR

The Office of Petroleum Coordinator is being charged by me with responsibility for recommending new projects for the manufacture of butadiene from petroleum and for assisting Rubber Reserve and Defense Plant Corporation to draw contracts covering the building and operation of Government-financed facilities. They will also present to this office the necessary requests for priorities and allocations incident to refinery conversions. They are responsible as well for seeing to it that necessary petroleum feed stocks are ready and are available when needed, and for aiding in problems of operation that may arise because of the close interrelationship of isobutylene and butadiene manufacture to other petroleum refinery operations. They are strengthening their technical staff and taking over responsibility for research and development in connection with the manufacture of butadiene from petroleum. The Committee recommended that funds be provided for this technical work, and in the absence of arrangements to the contrary, this office is having the funds for piloting operations provided, where necessary, by contract between research and development agencies and Rubber Reserve.

OFFICE OF DEFENSE TRANSPORTATION

This agency, in accordance with the recommendation of the Baruch Report, has been directed to limit the speed of motor vehicles to thirty-five miles per hour and to determine the needs of all commercial vehicles for gas and tires.

OFFICE OF PRICE ADMINISTRATION

In accordance with carefully elaborated recommendations of the Baruch Committee, the OPA has taken steps to limit civilian driving by the rationing of gasoline, to enlarge the present allotments of new and used tires of various descriptions, and to issue certificates for more retreading of worn tires. The OPA is responsible for a wider acceptance of "car pooling" as well as for periodic inspection of tires and a better understanding of the necessity of properly maintaining tires now in use. Under directive from me, they have arranged to buy those tires in excess of five which are owned by owners of passenger vehicles.

"All-reclaim" tires have been made for allocation by OPA, but it is still too soon for this office to state how much reclaim will be available for the manufacture of these tires after as much as possible of it has been used for the recapping of existing tires.

Steps are now being taken looking toward the best use of all reclaim available for the recapping of worn tires before their fabric has been so worn that the carcass is no longer recappable. To this end, it is planned to use to the maximum the facilities of all field recapping stations. Consideration will be given to the enlarging of some and the best use of molds and equipment to meet the problems that will arise as Thiokol comes into the picture.

There has been much confusing publicity in connection with the availability of "all-reclaim" tires and the meaning of the word "essential" driving. It is imperative that rationing boards and the public both realize that available reclaim should wherever possible be used

to recap tires before their fabric has been worn through so that they are no longer recappable.

We are rapidly approaching the time when our office must require certain manufacturers to use synthetics costing them much more per pound than the 22½c now charged for crude rubber. Unless there is to be a complete dislocation and demoralization of various parts of the rubber industry, it will be necessary either to compensate for this by subsidies or to permit an equitable adjustment of selling prices. The problem of how this can be accomplished without dislocation of the rubber program has still to be determined in conjunction with Rubber Reserve and the OPA.

DEPARTMENT OF AGRICULTURE

The Baruch Report recommended a large increase in the program for guayule, and the Department of Agriculture is taking steps to effectuate their recommendations. 88,000 acres of plantations will be established this winter. These are expected to provide 33,000 tons of rubber late in 1944 and early in 1945. It is planned to establish another 120,000 acres next winter to produce an additional 47,000 tons of rubber in the harvest of 1945-1946. The request for priorities for critical materials incident to this program is now under examination and final determination will be agreed upon in the near future.

Two regional laboratories of the Department of Agriculture are working on the problems incident to the extraction of rubber from guayule, cryptostegia, Russian dandelion, goldenrod, etc. At the Eastern Laboratories in Philadelphia, sixty-five men are working on these problems.

PLANT CONSTRUCTION

The primary responsibility here is that of overseeing plant and engineering construction. This involves special attention to insuring a minimum use of critical raw materials, and an even flow of raw materials to fabricators, and fabricated articles to plant sites. This operation also includes obtaining the priorities and allocations necessary if plant facilities are to be built in time. The situation pertaining to these problems has been discussed in some detail in the early section entitled "Program."

To facilitate the work of this section, every effort is being made to freeze designs. The recommendations of the Committee that certain pilot plants be established, are being followed and every effort is being made to complete one large-scale plant on the Standard Oil of New Jersey process of butadiene by March, 1943.

The Baruch Committee emphasized the desirability of completing as soon as possible one standard copolymerization plant. It is expected that the first of these units will be finished in March. To finish one earlier, would necessitate changes and interruptions which might result in almost disastrous delays to more critical portions of the program.

Facilities for the manufacture of considerable tonnage of Buna S by what is essentially standard plant design are already finished. These units are being run at less than one-fifth of their capacity because of the present unavailability of butadiene. Because of this shortage, all emphasis is upon bringing into production the first increments of butadiene and styrene. It is expected that the first butadiene will come from the first of the four units of the alcohol plant at Institute, West Virginia, and that this will be followed closely by the first increment of butadiene from petroleum at Baton Rouge, Louisiana. It is hoped that both of these will be producing early in the year. Unfortunately, these increments constitute only a little more than five per cent of the ultimate program.

OPERATIONS

Under "Operations" come all of the many functions of my office which have to do with rubber and closely related industries. In order that these operations may be efficiently carried out so as to conserve a maximum of rubber with a minimum dislocation of industry and labor, and of the needs of the armed services and other essential users of rubber, the organization of this group comprises many experts from various parts and units of the rubber industry. These experts have been chosen from both large and small manufacturers. Some are full-time members of the staff; others are acting as advisers.

The Baruch Committee emphasized the necessity of scrutinizing all requirements for rubber. We have inaugurated a plan to obtain detailed requirements from all the claimant agencies for end products of rubber or rubber substances to meet actual schedules of production of airplanes, trucks, ships and other products requiring rubber or rubber-like materials. This survey, which will be kept up-to-date monthly, together with our newly inaugurated survey of all inventories of all end products, will enable us shortly after the first of the year to control properly the consumption of natural rubber, synthetics and substitutes, and to regulate them by the possible liquidation of less-essential inventories of end products, in such a way as to conserve our diminishing stockpile of natural rubber.

We have taken the necessary steps to consolidate within the Office of the Rubber Director all important statistics with reference to rubber, with the understanding that only such reports as emanate from the Office of the Rubber Director will be considered authentic. This procedure should tend to relieve the confusion which has existed in the past as a result of so many different agencies of the Government and others compiling and releasing figures and other information regarding the rubber situation.

While the specific delegation to the Rubber Director of those priority powers affecting rubber necessary to discharge the responsibilities with which I am charged has not been completed, this is now being done. As soon as it is, this section will take over, in their entirety, the complicated problems incident to the detailed allocations of various crude rubber, synthetic rubbers, and rubber substitutes, and various grades of reclaim to be used for specific items, in such a way as to realize the maximum and most effective uses of each in effectuating the program as a whole.

The Baruch Report recommended that a survey of milling, mixing and tire-building facilities be made on or about May 1, 1943. Before another month we shall have complete engineering information covering milling and calendering equipment from practically all of the rubber industry. This will enable us promptly to complete the recommended survey, to the end that we may specify necessary and essential increases in milling and fabricating capacity in time to handle the increased requirements necessary when synthetic rubber is used in place of crude.

Within a month, a similar survey of reclaiming plants will be available in connection with the Baruch Committee's recommendation that reclaiming capacity be increased by about 20 per cent. Reclaimers estimate

that we may expect these proposals to provide for an increase of about 10 per cent by the elimination of "bottlenecks" in existing reclaiming plants, by changes in specifications in desired types of reclaim, and by the elimination of unnecessary types.

In accordance with the recommendation of the Baruch Committee, we are proceeding with the preparation of a new drive for scrap to be inaugurated whenever the scrap is needed to maintain an adequate scrap pile. Meanwhile, the supply is coming in automatically as tires are rationed to users who are turning in their worn-out tires and by the restriction against the possession of more than five (5) tires per vehicle.

The functions of the Board of Economic Warfare, Rubber Reserve and the State Department, in the development and procurement of natural rubbers from South and Central America, are confused. I am studying this situation and hope to determine a clear and definite program under which these agencies will operate.

Problems of Civilian Supply as they pertain to the organization of W. P. B. will receive further attention.

RESEARCH AND DEVELOPMENT

The Baruch Report recommended the establishment of a technical division, adequately staffed and with branches in charge of all phases of research and development (except for the production of butadiene from petroleum). It advised that there should be an interchange of information among those engaged in a competitive spirit in research, development and operation. A strong technical group of thoroughly competent, experienced, outstanding men has been gathered together under three Assistant Deputy Directors. These are discussed separately below.

TECHNOLOGY AND SPECIFICATIONS FOR INDUSTRY USES

This is the problem of technology and specifications governing the use of selected synthetics for each type of product now made from rubber. Since some of the proposed synthetics and substitutes may be available earlier than others, the saving of a maximum amount of crude rubber may involve, in the case of a single article, first using one substitute or synthetic and later switching to another. Much has already been done, but there is still a Herculean task ahead. Needless to say, results depend upon obtaining the full cooperation of industry and a close and constant working relationship with the statistical, allocations, and industry advisory groups of the operating section. Also concerned is the research group working upon improving the quality of the available synthetics. The practical problems of this section will be closely tied to the policies which will govern the pricing of synthetics and products made from them. Unless these provide an incentive to use synthetics, many of the weaker units are bound to hold back.

The staff of this section, made up of thoroughly competent men (at present there are sixteen) recruited primarily from both large and small units of the rubber industry, help by advising with the industry.

RESEARCH AND DEVELOPMENT OF SYNTHETICS

The Baruch Committee recommended centering all research for and upon synthetic rubber and substitutes in the Office of the Rubber Director. To accomplish this, the work of this group was organized under men of proven competency and scientific reputation into groups dealing with:

(1) Research into the mechanism of various polymerizations, and the character and structure of resulting polymers.

(2) Studies of and development of polymerization processes.

(3) The engineering of polymerization plants and equipment.

(4) The operation of pilot plants for the development of new methods of polymerization and new copolymers.

(5) The appraisal of new ideas and inventions.

RESEARCH AND DEVELOPMENT OF RAW MATERIALS

This section is responsible for the development of processes to make raw materials other than isobutylene, butadiene, and others developed by OPC, for use in making synthetic rubber and rubber substitutes. Particularly are they entrusted with the encouragement of and study of the piloting of proposed methods for making butadiene from alcohol or other chemicals made by the fermenting of grains.

The small but highly trained staff of this group include outstanding chemical engineers from faculties of leading educational institutions. These men also serve as Staff Consultants to me and my Deputy Director.

CONCLUSIONS

In conclusion I present the following:

(1) The Office of the Rubber Director has been organized and is, at least partially, staffed at every appropriate point with thoroughly competent, outstanding personnel who bring to it broad scientific and engineering trainings and an invaluable knowledge and experience of the rubber industry.

(2) The recommendations of the Baruch Committee have been accepted as the basic policy of the Rubber Director. Many of the proposed moves are nearing completion.

(3) The construction program is behind that envisioned by the Baruch Committee, but if it were possible to settle questions of relative importance between programs, it should still be possible to obtain an even flow of components and to build the required facilities in time to prevent the inventory of crude rubber and synthetics falling below the disaster dead-line determined by the Committee. Any further delay will make this impossible. Present indications are that, because of other programs, there will be such a delay.

(4) Working relationships have been established with several other sections of the Government to effectuate essential portions of the rubber program.

(5) Serious problems in connection with the work of the Office of Price Administration and the Office of Defense Transportation are to be solved so that the public may have a full understanding of the Rubber Program and help with it.

(6) Serious problems in connection with the work of the Office of Price Administration are to be solved so that all units of industry are given the proper incentive to help develop the use of synthetic rubbers and rubber substitutes.

WILLIAM M. JEFFERS

NOVEMBER 30, 1942.

The Role of Soap in the Rubber Program

By GEORGIA LEFFINGWELL, Ph.D.[1] and NORMAN RADIN[2]

THE rapid improvement of techniques for both synthetic and reclaimed rubber has emphasized the essential role played by soap. In this new and highly important war industry common soap is used in a great variety of processes and preparations as a powerful dispersing, lubricating, stabilizing and wetting agent. An indication of the huge quantities now being used for this purpose is the fact that the soap, in the form of a coarse grained powder, is shipped in bulk and in carload lots.

In the synthesis of synthetic rubbers of the butadiene type, butadiene and one or more co-monomers (styrene, acrylonitrile, methacrylate) are emulsified in soapy water and polymerized to form a latex-like suspension of Buna S, Buna N, etc.; the synthetic latex is then coagulated by acetic acid, washed, dried, and treated according to the desired use *(1)*. According to Cramer *(2)*, this process stems from the patents of Tschunkur, Bock, and Konrad *(3)*. The emulsification method of polymerization was gradually adopted and improved by American concerns and is now used universally here.

The use of soap in such reactions also appears even earlier, in a 1930 patent *(4)* which describes the self-polymerization of butadiene in soap dispersion with vulcanizing materials also suspended. Chloroprene, which is a self-polymer of chloro-2-butadiene-1,3, is prepared in a similar manner *(5)*. The importance of soap in helping to overcome the rubber shortage is demonstrated by the fact that most of the government-authorized plant expansion for the production of synthetic rubber is for the butadiene type.

Useful in Reclaim Dispersions

Soap helps to solve the rubber problem in yet another way—in the utilization of reclaimed rubber. The United Nations are going to depend more than ever on old rubber, and any method which promises to handle that rubber in an economical and versatile way receives serious consideration. Recovered rubber can be converted into fine particles and dispersed in water by means of soap to form an artificial latex which can be used much like natural and synthetic latices.

There are many methods for the dispersion process. In one procedure *(6)*, scrap rubber, 100 parts, is plasticized by working in a milling machine; 10 parts of soap are gradually added and the whole worked 10 minutes on a warm mill. Three hundred parts of water are then gradually added, yielding a latex which can be used to make many vulcanized articles. Another method *(7)* is to work crude or vulcanized rubber with about 5 per cent soap, then work in water containing a neutral peptizing agent (such as sodium ferrocyanide) until there is an inversion of phase. This artificial latex is claimed to be free of objectionable odor, to have no tendency to "skim over" on standing, and to dry at not too rapid a rate. Marchionna *(8)* advises the use of colloidal clay with the soap and also points out that sodium stearate (essentially hard soap) has its best emulsifying action at 100° C., and potassium stearate (soft soap) at a lower temperature.

Prevents Gelling of Mixtures

Mixed dispersions of natural and artificial latex are often desirable and can be made by the ingenious procedure of first adjusting the osmotic pressure of either or both of the latices with soap solution so that they are about equal. This prevents gelling on mixing *(9)*.

Thanks to soap, one authority prophesies a much expanded artificial latex industry *(10)*. Artificial latex made with soap has been used for electrodeposition *(11)*, replacing factice *(12)*, impregnating or coating fibrous materials *(13)*, and for other typical latex purposes.

Of similar importance to the war situation is the use of factice to replace rubber wherever possible. A factice dispersion, using soap as the emulsifier, may be prepared *(14)* by stirring hot colza oil with sulfur, cooling, and then homogenizing in soap water. The fluid product becomes paste-like on standing; to this is added a mixture of latex, sulfur, zinc oxide, piperidine-pentamethylene dithiocarbamate, and calcium sulfate. The resultant dispersion can be used for manufacturing a wide variety of articles.

A French formula *(15)* for rubber substitutes from which good results are claimed contains soap, 6 parts; strong glue, 100; glycerol, 125; colza oil, 11; castor oil, 18; gum tragacanth, 25; salicylic acid, 0.2; wood flour, 435; water, 200; suet, 3; formaldehyde treated resinate, 3; Bakelite in naphtha, 5; potassium dichromate, 3; and potassium alum, 6 parts.

The enormous expansion of the chemical industries to meet war requirements makes necessary the use of many more rubber-lined tanks and similar articles which are produced by electrodeposition. Klein *(16)* points out that the degree of coagulation of the latex used must be properly regulated in order that the rubber should strongly adhere to the base. This regula-

(1) Association of American Soap & Glycerine Producers, Inc., 381 Fourth Ave., New York City.
(2) Columbia University, 116th St. and Broadway, New York City.

tion, he claims, may be effected by adding soap to the rubber dispersion; this produces a much tougher and more adherent deposit. In one example, 6 to 12 g. soft soap are added to one liter of 30 per cent latex, which may or may not contain preservatives and compounding ingredients. The latex so treated can be deposited on a porous mold using a current of 3 amps./sq. dm. for 5 minutes.

The ability of soap to stabilize emulsions is well known, although, curiously enough, soap was used not so long ago for coagulating latex in Peru, Bolivia, and Central America *(17, 18)*. Numerous preparations of "reversible latex" are now made; these "Revertex" pastes or solids may be prepared by stabilizing latex by soap and removing water by evaporation, vacuum and air drying, spray drying, and similar methods *(19)*. Scholz *(20)* suggests the use of a salicylate (0.125%), potassium hydroxide (0.25%), and soft soap (0.5%) with the latex. The paste is reversed to any desired concentration by merely adding water. Reversible latices find numerous uses in the patent literature; they should also be useful for storage and transportation. Soap may be used as a stabilizing agent in latex suitable for the manufacture of dipped rubber articles *(21)*.

The lubricating qualities of soap and its solutions are less well known, although everyone has seen a carpenter soap a screw before driving it into hard wood. Soap solutions are an important lubricant in the molding of rubber articles, preventing the sticking of the article to the mold. According to Garner *(22)*, soap is superior to other lubricants for this purpose. He recommends spraying the solution rather than painting it on the mold with a brush as is so often done; the soap should be supplied in pipe lines under pressure and should contain some cyclohexenol (0.5% in a 2.5% solution) to prevent gelling when the pipes cool overnight.

For similar reasons, Garner also recommends the use of soaped liner cloths in the handling of tacky rubber sheets. The cloths should be impregnated with several soap solutions which are permitted to dry between coats. For heavier work, the cloth should be treated with either of two formulas: (A) cellulose acetate, 10 lbs.; boiled linseed oil, 20 lbs.; acetone, 10 gal.; soap, 1 lb. (B) cellulose acetate, 10 lbs.; boiled linseed oil, 18 lbs.; castor oil, 2 lbs.; camphor, 2 lbs.; acetone, 10 gal.; soap, 1 pound. The soap is dissolved in a little water, the oils emulsified with it, and the mixture added, with vigorous and continued stirring, to the solution of acetate in acetone.

Soap solutions are used to prevent sticking in handling tacky rubber strips *(23)*, rubber threads *(24)*, and a valuable rubber composition *(25)*. This rubber composition, which has the happy characteristic of containing much reclaimed rubber, may be used for tank linings and the like. Practically any type of rubber is converted to small particles and mixed with a rubber solution, containing reclaimed rubber, to impart the proper consistency. Vulcanizing ingredients and a small quantity of soap solution are added. The mixture is applied to an adhesive-covered surface by means of a trowel wet with soap solution.

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HydroLectric Motorized Hand Lift Trucks

HydroLectric motorized hand lift trucks, having rear wheel drive and automotive gear transmission with excess motor and battery power, are manufactured by Lift Trucks, Inc., Cincinnati, Ohio. These trucks are reported to be exceeding performance expectations. In a fourteen-day test at a large machine tool plant, the HydroLectric is said to have handled average loads of 5,000 pounds continuously from 20 to 24 hours instead of but 8 hours of 3,000-pound load as originally desired.

According to the manufacturers, any inexperienced operator can handle the HydroLectric. Maximum loads are easily shifted through a powerful hydraulic ram. Then, by pressing the patented finger control, heavy loads are moved forward or backward without effort. Advantages of this lift truck are said to include powerful motor, large battery, rear load wheel drive to insure positive traction, four wheel construction for safety and stability, balanced handle, and finger tip control.

Abstracts of United States Patents on the Compounding and Use of Synthetic Rubber

By FREDERICK MARCHIONNA, M. S. Chem.

Part VI

Calcott et al—U. S. Pat. 2,161,949—June 13, 1939. *Coagulating Synthetic Rubber.* (Assigned to E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware).

Butadiene and chlorobutadiene polymers, or co-polymers thereof with acrylonitrile, etc., which are polymerized in the form of an aqueous emulsion containing substituted ammonium salts as dispersing agents, such as cetyl trimethyl ammonium bromide, D-cetyl or C-cetyl alpha betaine, etc., are coagulated by means of a salt, such as NaCl, $CaCl_2$, Na_2SO_4, NaF, Na_2CO_3, KI, or NH_4Cl, admixed with an alcohol having a water solubility of about 8 to 12%, which includes ethoxy ethyl alcohol, chloro butenyl alcohol, diacetone alcohol, etc. In one example, a plastic polychloroprene latex containing polychloroprene (850) and 2% cetyl trimethyl ammonium bromide is coagulated with 100 parts of 7% normal butyl alcohol in water and then with 50 parts of saturated aqueous NaCl for each 100 parts of the latex. In another example, a copolymer latex from butadiene (45) and methyl methacrylic nitrile (30) in 70 parts of 3% aqueous oleamido ethyl dimethylamine hydrochloride is coagulated, after having been concentrated to 25% solids, with 120 parts of saturated NaCl and 100 parts of butyl alcohol for each 100 parts of the latex.

McDonald—U. S. Pat. 2,163,609—July 27, 1939. *Polychloroprene Cements.* (Assigned to B. B. Chemical Co., Boston, Mass.).

A liquid adhesive suitable for cementing leather parts comprises a plastic polychloroprene dissolved in a solvent liquid consisting of benzene and trichlorethylene in the ratio of 1 to 3:5.5 to 2. Thus, a cement may consist of a plastic polychloroprene (1) dissolved in benzene (2), and trichlorethylene (3). A preferred cement formula consists of plastic polychloroprene (900) containing 2% of phenyl-beta-naphthylamine, rosin (45), magnesium oxide (90), zinc oxide (45), phenyl-beta-naphthylamine as stabilizer (9), sulfur (27), and a butyraldehyde-aniline accelerator (12), dissolved in benzene (1690) and trichlorethylene (2850). The method of producing the liquid adhesive is described. The viscosity of such adhesives varies from 15 to 50 seconds, by a drop ball method.

McDonald—U. S. Pat. 2,163,610—June 27, 1939. *Polychloroprene Cements.* (Assigned to B. B. Chemical Co., Boston, Mass.).

In a method of preparing a polychloroprene cement of the type described in U. S. Pat. 2,163,609, a plastic polychloroprene is deodorized as described in U. S. Pat. 2,067,854, and one-half of the quantity thereof required is milled with rosin, phenyl-beta-naphthylamine, magnesium and zinc oxides, and sulfur, using three-quarters of the compounding ingredients, the milling being carried out at low temperature together with the already milled portion. The milled mixture is then dissolved in a liquid solvent without permitting the plastic mass to stand for any appreciable length of time. The solid in the cement may comprise the deodorized polychloroprene (100), phenyl-beta-naphthylamine (3), rosin (5), magnesium oxide (10), zinc oxide (5), and sulfur (3). Dissolution of the composition is effected by churning the milled mixture at about 80° F. for 6 to 8 hours.

McDonald—U. S. Pat. 2,163,611—June 27, 1939. *Polychloroprene Cements.* (Assigned to B. B. Chemical Co., Boston, Mass.).

A modification of U. S. Pat. 2,163,610 for producing polychloroprene cements consists of using a deodorized polychloroprene and a solvent liquid consisting of benzene and trichlorethylene with approximately 2% of diethylamine and approximately 3% of monoethanolamine. In preparing the cement, all of the zinc oxide is milled with a greater portion of the ethanolamine and a portion of the plastic polychloroprene, whereby scorching by the zinc oxide is inhibited; the balance of the ethanolamine and polychloroprene are then milled with the milled mixture and the mass then dissolved in the liquid solvent. A suitable adhesive is obtained by compounding, as above, plastic deodorized polychloroprene (907), magnesium oxide (91), zinc oxide (46), sulfur (27), monoethanolamine (30), diethylamine as 88% solution (23), benzene (1656), and trichlorethylene (1656), the solid being in grams and the liquid solvent in cc., the whole forming one gallon of cement.

McDonald—U. S. Pat. 2,163,612—June 27, 1939. *Polychloroprene Cements.* (Assigned to B. B. Chemical Co., Boston, Mass.).

In the method of preparing the polychloroprene cement described in U. S. Pat. 2,163,609, the polychloroprene compounded with the required ingredients is dissolved in an amount of solvent less than sufficient to impart the desired viscosity to the resulting solution and then a mixture of solvent and ethyl alcohol is added to the solution so that the cement solution is reduced in viscosity without coagulating the cement. This patent is a modification of that method. The quantity of the plastic polychloroprene and solvent liquid mixture may be 1 part of polychloroprene for each 1 to 3 parts of benzene and 5.5 to 2 parts of trichlorethylene. Thus, in a compounded cement formula such as described in the second formula in U. S. Pat. 2,163,609, which has a viscosity of about 30 seconds, the addition of 30 cc. of ethyl alcohol for each liter of cement will lower its viscosity to about 20 seconds. Instead of ethyl alcohol there may be used methyl alcohol, isopropyl or butyl alcohol, glycerine, diacetone alcohol, butyl carbitol, diethylene glycol, etc. The alcohol may be added a little at a time to the cement or may be incorporated in the solvent liquid.

Winkelmann et al—U. S. Pat. 2,164,367—July 4, 1939. *Oil-Resistant Product.* (Assigned to Marbon Corp., Gary, Indiana).

An oil and water-resistant product is obtained by reacting crude or reclaimed rubber or deproteinized rubber with gaseous hydrogen chloride at temperatures between 85° to 140° C.,

mixing other organic plastic and/or inorganic substances therewith, and molding under heat and pressure. Several examples are given. In one example, in which polychloroprene is used, equal parts of rubber and polychloroprene, with or without magnesium oxide, zinc oxide, etc., as heat stabilizers for the rubber hydrochloride, and curing agents for the polychloroprene, are milled and sheeted into sheets 0.02-inch thick and then treated with hydrogen chloride gas at 110° C. for four hours at a pressure of 300 lbs./sq. in. to obtain an insoluble rubber hydrochloride-polychloroprene hydrochloride mixture which can be used as a moisture-proof product.

Youker—U. S. Pat. 2,165,525—July 11, 1939. *Plasticized Polychloroprene.* (Assigned to E. I. du Pont de Nemours & Co., Wilmington, Delaware).

Polychloroprene made from emulsions, solutions, etc., of chloroprene is plasticized by treatment with aryl hydrazines, or salts thereof, or condensations thereof with aldehydes or ketones. Thus, a polychloroprene obtained by emulsion polymerization is plasticized by immersion in an equal weight of toluene containing 1% of phenyl hydrazine and 0.5% of glacial acetic acid; after 24 hours of agitation the plasticized polychloroprene is kneaded in an internal mixer to form a viscous, dough-like mass from which the solvent is removed by milling at 50° C. to obtain a soft, plastic sheet soluble in benzene, resembling plasticized natural rubber. In another example, 500 parts of polychloroprene are milled with 0.2% of phenyl hydrazine acetate to plasticize it.

Scholl—U. S. Pat. 2,165,818—July 11, 1939. *Bonding Rubber to Metal.* (Assigned to U. S. Rubber Co., New York, N. Y.).

Natural or polychloroprene rubber is bonded to a metal base by incorporating phosphorus tri- or penta-sulfide in the rubber to be bonded. It is stated that the phosphorus sulfide reacts with the rubber in effecting adherence to the ferrous metal. The rubber or polychloroprene containing the phosphorus sulfide may be interposed between two similar sheets containing no phosphorus sulfide and bonded to a metal covered with a layer of rubber containing the phosphorus compound by heat and pressure. From 1 to 5% of phosphorus penta-sulfide incorporated in the rubber or polychloroprene is said to be effective in bonding the rubber to the metal base.

Harkins—U. S. Pat. 2,167,716—August 1, 1939. *Composite Article.* (Assigned to U. S. Rubber Co., New York, N. Y.).

A chemically resistant composite structure comprises a supporting wall having a lining of hard rubber containing at least 30% of combined sulfur separated from the wall by an intermediate bonding and shock-absorbing layer of a rubber material containing from 12 to 20% of sulfur chemically combined with the rubber. The intermediate semi-hard bonding layer may be made from a polychloroprene rubber.

Crawford—U. S. Pat. 2,167,972—August 1, 1939. *Protective Rubber Surfaces.* (Assigned to the B. F. Goodrich Co., Akron, Ohio).

The preservation of surfaces of rubber articles from the action of oils and light, such as the inflation shoe used for ice removal from aircraft, is attained by applying over the exposed surfaces of the rubber parts a thin layer of a stretchable rubber-like composition which is highly resistant to the action of oils and sunlight and which includes electrically conducting filler so that the rubber article can be stretched while maintaining the electrical conductivity in the stretched surface. As such a protective coating there may be used a polychloroprene composition consisting of neoprene (100) and graphite (35) by volume, with 5% by weight of the polychloroprene of a softener, and small quantities of vulcanizing agents and an antioxidant. This composition may be dissolved in an organic solvent or dispersed in water. In the preparation of the article, a layer of lubricant, such as sulfated alcohol, soaps, cellulose ester, talc, soapstone, waterglass, etc., is applied on to a tin backing surface. A layer of the neoprene composition described above is applied over the lubricant layer, followed by a thin layer of neoprene without the graphite, a layer of neoprene-rubber (1:1) mixture, and a final layer of natural rubber. This composite structure is cured, stripped from the backing, and stretched over the airplane wings in the proper position.

Patrick—U. S. Pat. 2,169,814—August 15, 1939. *Cements* (Assigned to Thiokol Corp., Trenton, N. J.).

A cement of reduced viscosity when in the molten state is obtained from a polyethylene polysulfide which has been treated with 0.5 to 1.5% of a sulfurized Burgundy pitch or other bituminous pitch. Any such pitch is sulfurized by mixing 7 parts of sulfur with 5 parts of Burgundy pitch and heating in the presence of 1/16 parts of an alkali metal carbonate or sulfide as catalyst at 150° to 160° C. until evolution of the gas ceases. This sulfurized pitch is admixed with the polysulfide plastic in quantities from 0.5 to 1.5% and up to 50%. Fillers, such as clay, silica, asbestos, metal powder, cork dust, etc., may be added. The mixture is melted and used for cementing bricks to pickling tanks, as lining and joints for sewers, expansion joints for roads, coating ship bottoms when admixed with arsenic oxide or sulfide, mercury compounds, etc.

Habgood et al—U. S. Pat. 2,170,947—August 29, 1939. *Bonding Rubber to Polychloroprene.* (Assigned to Imperial Chemical Industries, Ltd., London, England).

Sheets of natural rubber are bonded to sheets of neoprene by means of an intermediate bonding layer containing a halogenated rubber and polychloroprene. The halogenated rubber may be produced by reacting rubber with chlorine, bromine, hydrogen chloride, hypochlorous acid, ethyl chloroformate, ethyl hypochlorite, etc. Several examples are given. In one, the bonding layer comprises polychloroprene (100), rubber hydrochloride of 7.4 or 11.3% chlorine (100), magnesium oxide (10), zinc oxide (10), stearic acid (1), sulfur (3), and accelerator (1.25). In another, it comprises polychloroprene (100), chlorinated rubber of 20% chlorine (50), smoked natural rubber (60), magnesium oxide (10), zinc oxide (10), stearic acid (1), benzidene (0.4), sulfur (3), and accelerator (1.25). In still another, the bonding layer consists of polychloroprene (100), natural rubber (70), and rubber reacted with phosphorus oxychloride, thionyl chloride, etc. (50), plus magnesium oxide, zinc oxide, sulfur, etc., as in the other examples. Production of the composite natural rubber-polychloroprene structures embodying the bonding adhesive layers is discussed in detail.

Payne—U. S. Pat. 2,173,744—September 19, 1939. *Composite Packing.* (Assigned to Crane Packing Co., Chicago, Ill.).

A composite packing comprises a plastic material having on the outer face only a fabric reinforcement. The plastic material consists of asbestos or other fibres, graphite and polychloroprene as a binder. These ingredients, plus a non-abrading metal powder if desired, are mixed uniformly and extruded in the form of a strip which may be rectangular and curved through a half-circle or in round cross-section. While being extruded, a cotton or asbestos cloth in the form of a tape is passed through an adhesive solution (rubber, resin, drying oil, etc.) and after passing through the adhesive it is contacted with the outer face of the packing core material. After drying, the composite strip is wound in helical form on a mandrel and cured. The cloth, as well as the wear surfaces of the packing, may be lubricated with a graphite in a binder so as to provide a dry lubricated face. This packing is specially adapted for use as a seal in reciprocating rods and plungers.

Hagen et al—U. S. Pat. 2,175,082—October 3, 1939. *Stable Polybutadiene.* (Assigned to I. G. Farbenindustrie, A. G., Germany).

Polybutadiene compounds, including polychloroprene and the methyl butadienes and their interpolymerization products with styrene, acrylic acid nitrile, etc., are stabilized against the effects of light and air by incorporating a small quantity of a sulfide of an alkylated phenol containing the alkyl group

in para position to the hydroxyl group of the phenol. In one example, an interpolymer of butadiene with acrylic acid nitrile in the form of an aqueous emulsion is worked with approximately 3% of di-(tertiary-amyl phenol) disulfide and 3% of phenyl beta naphthylamine which are added in the form of a 10% benzene solution. The resulting latex is then coagulated with sodium chloride solution. The coagulum (100) is admixed with carbon black (40), caoutchol (10), zinc oxide (5), sulfur (1), and accelerator (1), and vulcanized under a pressure of two atmospheres for 40 minutes. In the production of the above interpolymer, styrene may be substituted for the acrylic acid nitrile. In another example, the interpolymer of butadiene with acrylic acid nitrile, in the form of latex, is stabilized by adding 3% of cresol sulfide made by reacting 1 mol. of cresol with (1.1) mol. of sulfur chloride, this compound being added in the form of dilute lye solution. The sulfide of xylenols and chlorophenols may also be used.

Hauser—U. S. Pat. 2,175,798—October 10, 1939. *Porous Rubber Products.* (Assigned to Dewey & Almy Chemical Co., Cambridge, Mass.).

Porous products are prepared from natural or synthetic butadiene rubber by milling in the rubber a pore forming substance which does not become coated or embedded in the rubber matrix and which can be washed out or otherwise removed from the rubber. Such pore-forming substances include starch, dried meat fibrin, albumen, limed casein, etc., which can be removed from the vulcanized product by the action of proteolytic enzymes, and then washed out to form the porous rubber. In one example, corn starch (700) is milled with natural rubber, or polybutadiene, polychloroprene rubbers, etc. (300), sulfur (120), zinc oxide (10), and mercaptobenzothiazole (3). The milled mixture is calendered into sheet, placed between a form of soft rubber to avoid breaking of the vulcanized rubber, and cured at the proper temperature. Or a metal screen is sandwiched between two layers of the compounded rubber-starch stock, and cured. This cured product, in the form of battery separator or filter sheet, is immersed in a 0.5% solution of diastose, trypsin, pepsin, etc., at 35° C., and kept digesting in this solution for 4 hours to render all starch in the sheet soluble, which is removed by washing with water until the washings are free of water-soluble diastatic product.

Semon—U. S. Pat. 2,175,153—October 17, 1939. *Treating Rubbers.* (Assigned to B. F. Goodrich Co., Akron, Ohio).

Natural and synthetic butadiene rubber, polystyrene, polyacrylic esters, gamma-polyvinyl chloride, etc., are treated with glycerol, sugar, salt solutions, fused alum, calcium chloride, lead acetate, mercury, etc., at high temperature so as to obtain a thermoplastic product free from grain and internal stresses. Preferably, the rubber-like materials are floated over the treating liquid so as to relieve the internal stresses in the material. In the specific example given, the rubber-like material treated is polyvinyl chloride plasticized with 50% of tricresyl phosphate. The plasticized sheet is floated over a Hg-bath maintained at 150° C. so that the sheet contacts with the hot mercury for about one second. The synthetic sheet product shrinks in length but increases in thickness, and acquires a clear, glossy surface. If the treating liquid used is glycerol, then the cooled, treated sheet is washed with water and alcohol.

Bartell—U. S. Pat. 2,176,879—October 24, 1939. *Graphite Dispersion.* (Assigned to Acheson Colloid Corp., New York, N. Y.).

Stable graphite dispersions are prepared by kneading a mixture of graphite of 200 mesh with a non-polar, water-insoluble organic liquid, with or without a soap dispersing agent, and a stabilizer which is strongly absorbed by the graphite and remains absorbed when in contact with the non-polar organic liquid. The organic liquid may be kerosene, gasoline, creosote, fuel oil, carbon tetrachloride, etc. The stabilizer may be hydrogenated polybutadiene, hydrogenated rubber, etc. In the example given, 72 parts of 200 mesh graphite are mixed with 28 parts of hydrogenated polybutadiene (having a molecular weight of 7,000) and 7.2 parts of a sulfonated oil, mahogany soap, etc., and the mixture worked in a Banbury mixer for about 12 hours to form a smooth paste. This paste is thinned with a mineral oil having a colloidal stabilizing effect, such as steam-refined mineral oil having a flash point of 300° F., a fire point of 3.35° F., and a viscosity of at least 70 seconds Saybolt at 210° F. The resulting fluid paste is then dispersed in the non-polar liquid. It is stated that the graphite particles are coated with a film of hydrogenated polybutadiene so that they will not settle from the colloidal dispersing liquid.

Friedlander—U. S. Pat. 2,178,421—October 31, 1939. *Printer's Roll.* (Assigned to Dayton Rubber Mfg. Co., Dayton, Ohio).

A printer's roll comprises a cleaned metal axle coated with a rubber cement and a surface layer of polychloroprene or Thiokol, the latter consisting of a longitudinally and parallel arranged fibre embedded in a rubber matrix (sold as Stitlex), wound over the cement coating. An ink-resistant sleeve of polychloroprene, etc., containing 80% of clay, whiting or similar filler, is fitted over the fibre layer and the assembly subjected to a hot water cure at 250° to 260° F. under a pressure of 150 to 200 pounds to obtain a hard impression roll having a Shore reading of from 80 to 90 degrees.

Brooks—U. S. Pat. 2,185,586—January 2, 1940. *Filter Diaphragm.* (Assigned to U. S. Rubber Co., New York, N.Y.).

A flexible filter diaphragm is composed of a flexible microporous vulcanized rubber cemented to a ply of open-weave asbestos cloth by means of a latex cement. The microporous layer is obtained by compounding crude rubber (100), polychloroprene (100), sulfur (47), D.P.G. (4), and hydrous silica gel containing 72% of water (800). This mass is sheeted into sheets having 0.1 to 0.03-inch thickness. An asbestos cloth of special weave, having 22 ends per inch in the warp direction and 15.6 in the filler direction, is coated with a latex cement and the oil-resistant rubber layer described above pressed thereon. The assembly is vulcanized under non-evaporating conditions for 4 hours in steam at 70 pounds pressure, thereby obtaining a filter which is resistant to oils and chemically corrosive liquids. The porosity of such filters may be increased by dissolving out the silica gel with an alkali solution. The microporous rubber sheets may be cemented to both faces of the asbestos cloth.

Waterman et al—U. S. Pat. 2,185,656—January 2, 1940. *Hardening Olefine Polymers.* (Assigned to Shell Development Co., San Francisco, Calif.).

In a method of hardening polymers from conjugate diene H.C., films, thread, coatings, etc., of such polymers are heated at 80° to 150° C. in contact with a halogenated hydrocarbon in an oxygen free atmosphere. Amounts sufficient to effect hardening of the polymer are used. The polymer may be from natural rubber, cyclo rubber, polybutadiene, polychloroprene, etc. The halogenated hydrocarbon may be chlorobenzene, benzol chloride, 3-chloro-benzylidene chloride, benzo trifluoride, chlorocyclohexane, diphenyl oxide, amyl chloride, etc. These polymeric dienes are catalytically hardened by heating them in the presence of any of the named halogenated compounds in an atmosphere of N_2, H_2 or CO_2. In one example, a sodium polybutadiene rubber is dissolved in benzene to form a 10% solution which is filtered and spun into threads by passing it through spinnerets and into ethyl alcohol and dried. After passing the threads through a glycerine bath maintained at 130° C., they are hardened by heating for about one hour at 125° to 130° C. in an atmosphere of carbon dioxide containing about 1% of mono-chlorobenzene vapor, thereby obtaining hardened threads having a tensile strength greater than 3Kg/cm.^{2}. Examples for hardening electrical apparatus, abrasive cloths, paper, etc., treated with the polymers are given.

(To Be Continued)

Editorials . . . . . .

Holiday Greetings

ALTHOUGH the entire universe is torn with strife and battle, once again the Christmas Holidays are with us. As inevitable as is this Holiday Season so inevitable is the complete defeat of the evil forces which have stirred up this maelstrom of hate and prejudice. It is with the fervent hope and prayer of an early victory that the staff of RUBBER AGE takes this opportunity to wish its friends a Merry Christmas and a truly Happy New Year.

THE PUBLISHERS.

Here We Go Again

WITHIN the past few weeks there has been definite evidence that certain Congressional blocs, particularly the farm bloc, will re-open investigations of the entire rubber situation. Already, the Senate Agricultural Subcommittee, headed by Senator Gillette, has begun calling witnesses. Both Rubber Director Jeffers and Price Administrator Henderson are slated for early appearances before this and other committees.

The new investigations, actually continuations of former ones, will accomplish little except to again create confusion in the mind of the public. Once again brilliant "scientists" and "inventors" will appear in the public eye with plans and programs for accomplishing miracles overnight. Once again recognized technologists will have their decisions challenged and ridiculed in the public press.

In the past few months order has been established out of the rubber chaos. The Office of the Rubber Director has been organized and is functioning smoothly. Some of the best technical talent in the country is now associated with this office. True, as Rubber Director Jeffers indicated in his recent report to Donald Nelson, threatened delays may interrupt the synthetic rubber program, but, as President Roosevelt has stated, such delays can quickly be overcome by military authorities who are in the best position to know what they need first. Then why the need for further Congressional investigations?

Pleasure Driving

FOR THE PAST several months we have urged that unnecessary driving be further restricted. Our darts have always been aimed particularly at those motorists in metropolitan areas who have access to other means of transportation and still use their cars to go to the movies, bridge parties, dances, etc. These are the motorists who carefully conserve their ration supplies until Saturday or Sunday and then make certain they use their full weekly quota.

We feel gratified that the special committee of the Senate investigating war industries, more popularly known as the Truman Committee, after a thorough investigation of the need for nation-wide gasoline rationing, reported the rationing program to be "abundantly justified" and then recommended that all pleasure driving be completely eliminated. Our campaign for additional restrictive measures on non-essential driving, too, seems to have been "justified." We urge early action on the part of the rationing authorities. There is still a war to be won.

CURRENT NEWS OF THE MONTH

JEFFERS WARNS ON THREATENED DELAYS TO COMPLETION OF SYNTHETIC RUBBER PROGRAM

IN his first report to Donald Nelson, Chairman of WPB, since his appointment as Rubber Director, submitted on December 4, Mr. Jeffers warned that threatened delays in the construction of synthetic rubber plants may reduce the nation's rubber stockpile below the "disaster deadline" of 120,000 tons set by the Baruch Committee. "Present indications are that because of other programs there will be such a delay," Mr. Jeffers said.

The report indicated that the delay has resulted from fabricated components, such as instruments, forgings, and heat exchangers, rather than from materials. "Our studies have emphasized that unless these components for synthetic rubber manufacturing plants reach the plants as rapidly as they can be installed," the report continued, "the resultant delay will cause such a drain on crude rubber stocks that there may be no crude left for heavy-duty tires, self-sealing gasoline tanks, and other military uses which demand crude rubber."

Mr. Jeffers stated that a scheduling mechanism now being put into effect may solve part of the problem, but he added that the only sure solution of the rubber problem is to subordinate other programs to it. Other highlights of the report, which is reproduced in full on Page 229 of this issue, included the following:

Other Highlights of Report

(a) Future rubber needs are as follows: *Military*—325,000 tons in 1943 and the same in 1944; *Private Transportation*—3,000 tons in 1943 and the same in 1944; *Commercial Vehicles*—59,000 tons in 1943 and 85,000 in 1944; *Other Civilian Uses*—49,000 tons in 1943 and 50,000 in 1944; *Foreign Countries*—117,000 tons in 1943 and 103,000 in 1944; *British Deficiency*—24,000 tons in 1943 and 106,444 in 1944.

(b) A policy of rigid conservation of rubber must be continued through the Fall of 1943 and the country must envisage the possibility of complete exhaustion at that time of even so-called normal inventories of finished products.

(c) Since the Government may soon require rubber manufacturers to use synthetics costing more than the 22½c a pound charged for crude rubber, it will be necessary to compensate for the higher manufacturing cost by subsidies or by permitting an equitable adjustment of selling prices.

(d) Final arrangements have been made for a portion of the recommended 100,000 tons a year additional capacity of butadiene from refinery plant conversions.

Prior to the presentation of his first progress report to Chairman Nelson, Mr. Jeffers was reported to be dissatisfied with the efforts of WPB and OPA on the rubber program. Testifying on November 19 before the Senate Banking and Currency Committee on a bill prepared by the Senate Small Business Committee, he classified OPA's tire pricing, rationing and registration methods as cumbersome and unnecessarily complicated, and indicated that a new program of tire distribution was being worked out under his direction and would be put into effect in the near future.

As far as WPB is concerned, it was reported that Mr. Jeffers disliked the restrictions placed upon him, since he wants to increase greatly the production of industrial alcohol from grains and to give various companies the material priorities they need to build plants to make rubber from agricultural products. Some of this dissatisfaction is evident in his initial report.

The final decision on top priorities lies within the authority of the Army and Navy, according to President Roosevelt. The President made this clear at his press conference of December 11 when asked whether he plans to issue a directive giving such priority to materials needed in completing the synthetic rubber plants. He said that while completion of the synthetic rubber plants was essential to the war effort, the availability of sufficient supplies of aviation gasoline, as an example, fell into the same category, and therefore the decision was up to Army and Navy officials.

Justify Gasoline Rationing

After several weeks' investigation into the handling of the situation by Federal agencies, the special committee of the Senate investigating war industries reported on December 11 that the nation-wide gasoline rationing program was "abundantly justified." The committee, which is headed by Senator Truman, of Missouri, recommended complete elimination of pleasure driving and general simplification of Federal procedure in the handling of mileage rationing.

Appearing before the committee on November 27, Rubber Director Jeffers reviewed the rubber situation, particularly as it affects tires for passenger cars and trucks, and discussed the outlook for the future. He revealed that as of the end of October, the crude rubber stock in the United States was 465,232 tons, that current consumption is at the rate of 29,000 tons a month, and that continuing this rate of consumption for the 10 months ending September 1, 1943, will reduce our stockpile to approximately 200,000 tons, after allowing for possible importations during that period of approximately 25,000 tons.

Pointing out that the Baruch Committee warned that it would be unsafe to reduce our domestic rubber inventory below 120,000 tons at any time, Mr. Jeffers stated that our imports are now running at the rate of about 2,000 tons per month, the total stockpile of the allied nations, outside of the United States and Canada, is approximately 200,000 tons, which is being consumed at the rate of 16,000 tons a month, and that continued consumption at that rate would reduce the stockpile outside the United States by September, 1943, to considerably below the point of reasonable safety.

Gives Statistics on Tires

If all goes well, Mr. Jeffers testified, we should be able to allocate important quantities of rubber for the manufacture of civilian tires in the early months of 1944. Thus, if there is no hitch in the program, we should be able in 1944 to replace in a large measure the tires now in use on the 27,000,000 passenger cars and 5,000,000 trucks operating in the United States.

Pointing out that normally we required 48,000,000 tires a year to keep our transportation on wheels, 30,000,000 of which were replacements and the balance tires on new vehicles, Mr. Jeffers said that in 1943 we will have only 30,000,000 tires of all kinds, including recaps, only a few of which will be new tires with anything approaching the mileage to which the American motorist is accustomed. Of that 30,000,000 tires, he said, some 13,000,000 are new tires in inventory and usable tires acquired under the Idle Tire Purchase Program; 6,000,000 will be new tires made of reclaimed rubber; and the remainder will be retreads on existing carcasses.

Leon Henderson, in his capacity as head of OPA, also testified before the

committee on November 27. He defended the rationing program and said that voluntary rationing will not meet the standards of the Baruch report. Gasoline consumption in non-rationed parts of the country (prior to December 1) had been cut down only 17.9% since September, 1941, while in the rationed area in the East the reduction amounted to 43%.

Nation-wide gasoline rationing went into effect on December 1 despite the opposition of certain Congressmen. In identical letters sent to Mr. Jeffers and Mr. Henderson on November 26, President Roosevelt rejected the pleas of a Congressional group which had sought postponement of the program for six months. Mr. Roosevelt asserted that the nation-wide mileage rationing program must get started on December 1 if victory was not to be delayed through failure to support our fighting forces. Rubber Director Jeffers had consistently opposed efforts to force postponement of the program. The program was originally scheduled to be put into effect on November 22, but was delayed a week due to printing, transportation and other problems.

Senate Plans New Probe

A renewal of the investigation launched last year into the synthetic rubber situation by the Senate Agricultural Subcommittee, headed by Senator Guy Gillette, of Iowa, was promised by Senate advocates of a rubber-from-grains industry on December 11. The same sources hinted at new legislation to speed the progress of such an industry. The first legislation aimed in this direction was vetoed by President Roosevelt and indirectly led to the appointment of the Baruch Committee and the selection of a Rubber Director.

The new investigation which, according to Senator Gillette, was the result of "renewed pressure on the agriculture subcommittee from all over the country," was slated to get under way almost immediately. Rubber Director Jeffers will be among the first witnesses called. The subcommittee was authorized on November 30 to use additional funds for its investigation.

Senator Gillette expressed full confidence in Mr. Jeffers, but emphasized that nothing has been done to increase materially the production of synthetic rubber beyond original estimates of WPB or to utilize rubber-from-grains methods. The Baruch Committee recommended that plants be constructed in the grain belt to produce 100,000,000 gallons of industrial alcohol from grains for butadiene, but WPB has apparently ignored the suggestion, according to Senator Gillette.

The Baruch Committee also recommended construction of a plant to make industrial alcohol from grains in Muscatine, Iowa, to meet the requests of a small company which was adequately financed and had the necessary materials, and even this company's program has not been approved by WPB, he said.

N.A.M. Criticizes Policies

In a special 56-page report on "War Production and Shortages of Basic Materials," dated October 17 but released on November 23, the National Association of Manufacturers attributed the critical shortage of rubber to government inaction when the nation's sources of crude rubber first were threatened and to the Administration's confused approach to the synthetic rubber program. The report was submitted to the Association's three-day War Congress of America, held in New York City, on December 2-4.

Borrowing liberally from the recent report of the Baruch Committee, the N.A.M. report pointed out that the plantation program designed for South America and the attempts to grow guayule and *kok-sagyz* in this country cannot offer a solution. It will take 7 to 10 years to obtain any appreciable amounts of rubber from the plantation program and "the only way to get through the rubber crisis is to conserve present rubber stocks and to push the synthetic rubber program to completion."

Pointing out that 1943 will be a critical year insofar as rubber supplies are concerned, the report states that if a delay occurs in the synthetic rubber program the production of Buna S will fall below 200,000 tons, the necessary goal, but if the production of Buna S moves at the hoped-for rate, we will have a supply of about 100,000 tons above our necessary requirements.

Tire Bill Is Approved

On November 24 the Senate Banking Committee approved legislation introduced by Senator Ellender (Louisiana), designed to aid the smaller, independent tire dealers (S. 2560). According to Senator Ellender the bill will help keep 200,000 independent tire dealers in business by making them official tire inspectors and giving them the exclusive right to sell and service tires and tubes.

Knocked out of the final version of the bill, however, was the proposal that at least 3,500 tons of crude rubber annually be set aside from Government stocks to provide retreaded tires for the nation's 27,000,000 passenger cars. At a hearing on the bill on November 14, Rubber Director Jeffers had objected particularly to the inclusion of this provision. Furthermore, it was pointed out that the tire retreading plan announced by the Rubber Director previously eventually might exceed the scope of the original proposal.

The bill authorizes and directs Mr. Jeffers to order tire inspections at regular intervals (a step already taken) and provides that only independent tire dealers shall make the inspections, with maximum charges subject to order of the director. Likewise, all new and retreaded tires could be sold or delivered only by independent dealers.

The term "independent dealer" was defined to exclude corporations a majority of whose voting stock is owned by another corporation which is not an independent tire dealer and also to exclude dealers who are required to sell any brand of tire exclusively.

The bill also authorizes the Rubber Director to buy or requisition recapping and retreading equipment from localities where it is not needed for distribution among independent dealers in communities where such facilities are lacking.

ANOTHER GOVERNMENT-OWNED SYNTHETIC PLANT STARTS PRODUCTION

Another of the large scale Government-financed synthetic rubber plants has begun production operation, according to a statement made by John L. Collyer, president of the B. F. Goodrich Co., on December 6. The new plant is located in Kentucky and is described as an important unit in the large-scale synthetic rubber program. The new plant, it was said, will ultimately utilize butadiene made from alcohol and will shortly be in full scale production.

According to a statement by Senator Thomas (Oklahoma) on December 2, all sites have been chosen and the necessary money allocated for plants to produce at least 800,000 tons of synthetic rubber annually. The Senator, a member of the Senate Agricultural Subcommittee which has been investigating the rubber situation, added that he had been advised that the entire program was about to get under way but he did not know where the plants would be located.

Following an executive session of the House Committee on Banking and Currency on December 1, Chairman Steagall (Alabama) disclosed that Jesse Jones made a statement to the effect that the production rate of synthetic rubber would reach "something like" 1,000,000 tons annually by the end of 1943. The committee approved a measure increasing the loaning authority of the R.F.C. by an additional $5,000,000,000, and while no statement was made as to the uses to which the additional loans would be put it was surmised that a good portion of it would be spent on the synthetic rubber program.

Form National Synthetic Corp.

On December 3, Jesse Jones, in his capacity as head of the Reconstruction Finance Corp., announced that the Rubber Reserve Co., which is an RFC subsidiary, has made a contract with the National Synthetic Rubber Corporation to operate a new Government-owned synthetic rubber plant to be built in Kentucky by the Defense Plant Corp., also an RFC subsidiary. It is expected that

W. W. Benner

is president of the newly-organized National Synthetic Rubber Corp.

Dr. B. J. Oakes

will act as executive vice-president and general manager of company.

the new plant will be completed about June of next year.

The National Synthetic Rubber Corp. is a newly-organized company formed by five independent rubber manufacturers for the specific purpose of operating the new plant. The five companies are: Goodall Rubber, Inc., Trenton; Hamilton Rubber Mfg. Co., Trenton; Hewitt Rubber Corp., Buffalo; Minnesota Mining & Mfg. Co., St. Paul; and Lee Rubber & Tire Corp., Conshohocken, Penna. The Whitehead Bros. Rubber Co. of Trenton is the manufacturing affiliate of Goodall Rubber, while the Inland Rubber Corp., of Chicago, is a subsidiary of Minnesota Mining.

W. W. Benner, vice-president of Lee Rubber, is president of the new National Synthetic Rubber Corp., and Dr. B. J. Oakes, chief chemist of Minnesota Mining, is executive vice-president and general manager. William M. Collins, Jr., also of Minnesota Mining, is vice-president and treasurer, and B. T. Moffatt, vice-president of Hewitt Rubber, vice-president. E. H. Letchworth, of the Buffalo law firm of Kenefich, Cooke, Mitchell, Bass & Letchworth, is secretary.

Directors of the company include the following: A. A. Garthwaite (Lee Rubber), chairman of the board; Thomas Robins, Jr. (Hewitt Rubber), vice-chairman; W. L. McKnight, William M. Collins, Jr., and John L. Connolly (Minnesota Mining); W. W. Benner and Henry Hopkins, Jr. (Lee Rubber); B. T. Moffat (Hewitt Rubber); Henry N. Young, Jr., and A. Boyd Cornell (Hamilton Rubber); and F. B. Williamson, Jr. (Goodall Rubber).

The working capital and executive and technical staffs have been supplied to the new company by the five sponsoring independent rubber manufacturers in approximate proportion to their respective size and range of operations. The products made by the sponsoring companies range from coated abrasives to tires. All five companies are busily engaged in war work. Several of them are normally in direct competition with one another.

The Kentucky plant to be operated by the National Synthetic Rubber Corp. will be devoted to GR-S (the new term for Buna S type rubber produced in Government-owned plants) and its entire output will be made generally available and allocated by the Government. It will have a capacity of 30,000 long tons annually, which compares with the 23,300-ton average for the other copolymer plants in the Government program, the 20,000-ton average for the Butyl plants, and the 13,300 tons for the neoprene plants. Butadiene for the plant will probably be supplied by one of the Carbide & Carbon plants in the locality.

Prepare Fundamental Designs

It was revealed on December 1 that the Defense Plant Corporation, on the recommendation of the four leading rubber companies—U. S. Rubber, Goodyear, Goodrich and Firestone—has selected the Blaw-Knox Co., of Pittsburgh, to prepare the fundamental engineering designs for the copolymerization plants for the entire synthetic rubber program.

Blaw-Knox has been working on such designs for several months and through a subsidiary, the Blaw-Knox Construction Co., is engaged in the engineering and construction of six plants for the manufacture of synthetic rubber from butadiene and styrene. Four of the plants are completely new installations, while two are additions to plants previously built by the company and already in operation.

The largest of the new plants is an installation for U. S. Rubber. Others are two plants for Firestone and one for Goodrich. The two plants being enlarged are having second units installed. These are a plant for Firestone and another for U. S. Rubber. The first units at Firestone and U. S. Rubber are now in operation.

To Study Russian Process

Four American rubber and chemical experts will leave for Russia shortly to study the Soviet's synthetic rubber processes. The mission will be headed by Ernest Pittman, president of the Inter-Chemical Co., of New York City. Rubber Director Jeffers is said to have arranged the mission in line with the Baruch Committee's criticism of Government officials for failure to have called upon the Russians for aid in organizing the synthetic rubber program. The Russians have been producing synthetic rubber from alcohol for some ten years.

Commodity Reports Modified

On November 6, OPA issued Amendment 39 to Supplementary Regulation No. 1 of the General Maximum Price Regulations. This amendment eliminates the requirement that sellers of commodities entering into the production of synthetic rubber and aviation gasoline submit detailed contracts to OPA. Originally the exemption from price regulation of such commodities to these classes of purchasers required that contracts made under the exemption privilege be submitted for approval. This requirement put sellers to unnecessary expense and the new amendment permits the submission of summaries only.

AGRIPOL

The commercial production of Agripol, the name given to a new synthetic rubber-like material produced from soy beans, was announced to the public in newspaper advertising by Reichhold Chemicals, Inc., Detroit, Michigan, on November 22. The new material is produced from the fatty acids extracted from soya bean oil, these fatty acids being polymerized with ethylene glycol, obtained through the dehydration of ethyl alcohol.

According to an announcement issued by Reichhold Chemicals, Agripol was made possible through initial research begun by the Northern Regional Research Laboratory of the Department of Agriculture at Peoria, Ill., which last spring demonstrated that a rubber-like product (Norepol) could be made by the polymerization of the fatty acids extracted from domestic vegetable oils. Reichhold chemists have worked closely with the Peoria staff.

(EDITOR'S NOTE: The Vulprene polymers marketed by the American Resinous Chemicals Corp., Peabody, Mass., are also based on the Norepol experiments. Several other companies are known to be engaged in pilot plant research and development on Norepol but none of them are believed to have started commercial production).

Chief credit for the development of Agripol is given to Clinton Braidwood, 28-year old chemist employed by Reichhold. Mr. Braidwood is said to have been graduated from the Michigan State College only a few years ago. The name "Agripol" was selected as best expressing the combination of agricultural products and the polymerization process.

At present, Agripol is not offered as a substitute for rubber in the manufacture of tires, but its use for multitudinous mechanical products of a critical nature is said to have been demonstrated to a sufficient degree to absorb the company's entire 1943 contemplated output. Present production capacity for the manufacture of the new material is approximately 250,000 pounds per month, but this is expected to be increased to 2,000,000 pounds per month by February and 4,000,000 pounds per month by May, 1943, provided raw materials are allocated for the purpose and permission is granted by WPB for a modest amount of additional equipment. Subsequent expansion in 1943 may bring total annual production up to a minimum of 50,000,000 pounds.

Reichhold Chemicals frankly states that in certain of its physical properties Agripol is inferior to natural rubber, particularly where high tensile strength and resistance to severe abrasion are desirable properties, as in tires. However, tests have indicated that in flexibility at low temperatures Agripol is the comparative equivalent of natural rubber for all practical purposes, while in aging tests it behaves in superior fashion. It is also said to be less susceptible to attack by the elements than natural rubber and to surpass it considerably in resistance to oxidation.

Agripol vulcanizes at about the same temperature range as natural rubber and can be worked on existing rubber machinery. In compounding, the customary fillers are employed, but the use of plasticizer is essential.

According to Henry Reichhold, chairman of the board, Reichhold Chemicals, Inc., is the world's largest manufacturer of synthetic resins and is the largest user of soya bean oil for industrial purposes in the United States. The company maintains plants at Detroit, San Francisco, Elizabeth, N. J., Brooklyn, N. Y., and Tuscaloosa, Alabama, as well as in Sydney, Australia, and Liverpool, England.

Mr. Reichhold, in a statement accompanying the announcement of Agripol, said that industry has been assured by the Government that there will be a sufficient supply of soya bean oil available to assure the production of 200,000,000 pounds of "chemurgic rubber" annually, if such an amount is needed.

NEW SYNTHETIC PROCESSES

Reports of several new processes for the manufacture of synthetic rubber have come to light in recent weeks. These include the following:

The production of synthetic rubber from turpentine at a cost of only 8c a pound and requiring only a negligible amount of critical materials for plant construction was outlined to the Senate Agricultural Subcommittee in Washington on December 11 by Albert W. Spanier, president of General Catalytics, Inc., of Detroit. Mr. Spanier and John A. Colman, an associate, are said to have developed the process.

Clinton Braidwood, left, chief developer of Agripol, is seen showing a sample of the new "chemurgic rubber" to Henry Reichhold, board chairman of Reichhold Chemicals, Inc.

Sherwin-Williams Co., Cleveland, a large producer of chemicals used for synthetic rubber, is reported to have developed a new type of synthetic which may prove useful for jar rings and miscellaneous mechanical purposes. The report was made by A. W. Steudel, president of the company, at the annual meeting of stockholders in Cleveland on December 8.

The Bureau of Mines reported on November 25th that its scientists are studying ways to produce a synthetic rubber base from coal. No further explanation was forthcoming. Engineers at a pilot plant in Pittsburgh have already developed a motor fuel from coal which is said to work satisfactorily as a substitute for gasoline.

A new technique for processing synthetic rubber so that present rubber mixing machinery would be adequate to take care of the conversion from natural to synthetic rubber in the manufacture of tires and other products was announced by John W. Thomas, chairman of the board of the Firestone Tire & Rubber Co., on December 7. Mr. Thomas stated that information on the new technique would be passed along to the entire rubber industry.

BUTADIENE

Although it was hoped that the first butadiene plant in the Government's synthetic rubber program would get into actual production early this month, the Office of the Rubber Director reported on December 6 that such production had been delayed due to inability to obtain delivery on a needed heat interchanger because its manufacturer was tied up with prior orders. This is one of the plants to be operated by the Carbide & Carbon Chemicals Corp. near Charleston, West Virginia. It is believed, however, that production will get under way in a matter of weeks.

In the meantime, the Koppers Company is rushing the butadiene and styrene units it is constructing in the Beaver Valley a few miles below Pittsburgh. These will be among the largest units in the country and, according to Dr. William F. O'Connor, of the company's butadiene division, will be completed early next spring. Faced with a shortage of skilled and semi-skilled help to operate the plants when completed, Koppers is recruiting men and women to attend special classes which will fit them for the coming jobs. Sixty-three women and seven men are already attending a class in elementary chemistry and plant operation being taught at the University of Pittsburgh.

A combination petroleum-grain alcohol plant for the production of butadiene in Gary, Indiana, is reported to be under consideration. The plan for such a plant is believed to have been submitted to the Office of the Rubber Director and a decision is pending. The previous plants in Gary, which were to have been operated by Rubber Synthetics, Inc., were cancelled some two months ago, as was the polymerization plant planned in the same area.

More vital raw materials for synthetic rubber and more 100 octane aviation gasoline can be made as a result of a revolutionary new catalytic process —isoversion—recently discovered in its research laboratories, according to the Phillips Petroleum Co. Isoversion, according to a statement issued on November 17 by Frank Phillips, chairman of the board, changes petroleum products formerly of almost no value in the war program into products which are vitally needed. Military secrecy, according to Mr. Phillips, prevents the disclosure of any definite data on the isoversion process, but it is believed the reference to vital raw materials for synthetic rubber pertains to the increased production of butadiene, the manufacture of which is closely related to aviation gasoline.

ISOPRENE

The manufacture of isoprene from turpentine is rapidly nearing the commercial stage, according to reports in the naval stores field. Both Hercules Powder Co. and Newport Industries, Inc., are known to have commercial plants under construction and both are reported to have sent experimental quantities of isoprene to the polymerization plants. New facilities will shortly be completed in the naval stores section of the South, however, and commercial quantities should be available when the synthetic rubber program really starts rolling in 1943.

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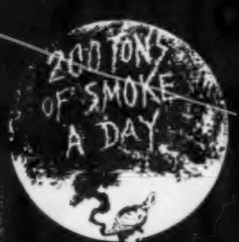

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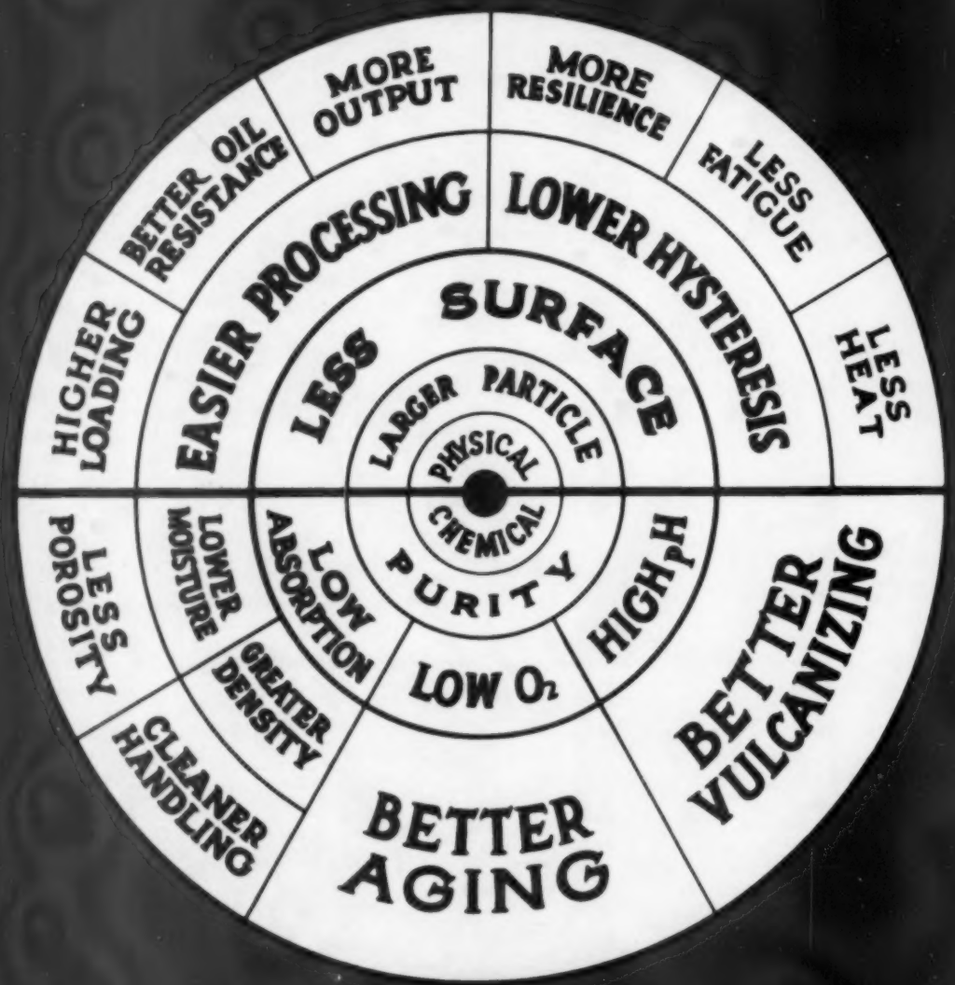

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Isoprene is essential to the production of Butyl and some of the other types of synthetic rubber. To date, the synthetic rubber industry dependent on isoprene has been dependent chiefly upon the inadequate amounts obtained in the cracking of gas oil and low-grade gasoline. The most important producer of isoprene from petroleum has been the Standard Oil Co. of Louisiana, although small quantities have also been furnished by the United Gas Improvement Co.

In contrast to the petroleum-derived product, which is recovered with some difficulty, the chemical industry's product is said to be almost 100% isoprene. It has been determined that isoprene finds application in the processing of the synthetic rubbers as well as in their production, imparting tack to laminates and furnishing increased aging resistance. Processing techniques are now being worked out by the naval stores manufacturers.

CRUDE RUBBER SITUATION REPORTED SHOWING CONTINUED PROGRESS

The battle to bring in huge amounts of crude rubber essential to the well-being of this nation and its armed forces from the Latin American countries continues, with conflicting reports still rampant as to amounts which may be expected. For the most part, however, the reports, particularly those with official or semi-official backing, are tinged with encouragement.

The arrival in Dallas, Texas, early last month of Tom Braniff, pioneer airline operator, with an airplane carrying 4,000 pounds of crude rubber from Nicaragua exemplifies the rapid strides being made in the efforts of the Rubber Reserve Co. to obtain supplies in the Western Hemisphere. Officials of the Bureau of Economic Warfare were quick to point out that there had not been a shipment of rubber out of Nicaragua in practically thirty years. They added that on the basis of initial surveys it was estimated that 200 tons a year could be expected from Nicaragua, but it now begins to look like we may get five to ten times that much from that country.

The same optimism was expressed where other of the Latin American countries are concerned. Production in Panama has been described as two or three times more than was expected and the latest survey completed in Mexico indicates that the yield there will be considerably more than in any of the Central American countries. It was stressed, however, that no matter how much crude rubber is received from these countries over and above earlier estimates, it would all still be earmarked for military and essential civilian uses.

According to a report from Mexico, that country has established a ceiling price of 4.15 pesos per kilogram for washed, coagulated and sheet rubber at the points of concentration of the production zones of the country. The ceiling was set by presidential decree. The rate is intended to serve as a base for differential prices for each of the concentration centers, less the costs of freight and other transportation services from these centers to Mexico City.

Health Programs Progressing

One of the biggest problems facing those concerned with the Western Hemisphere rubber program is making disease-infested jungle areas suitable to work and live in. This is particularly true of the jungles in Brazil and Bolivia, where malaria flourishes. Special health programs have been launched in practically all Latin American countries and considerable progress has been reported.

For instance, the Office of the Coordinator of Inter-American Affairs recently stated that nearly 10,000,000 atabrine tablets have been forwarded for distribution to rubber tappers entering the Amazon jungles and to other tropical workers. Atabrine is synthetic quinine and is the chemist's answer to the critical shortage of the natural quinine. The atibrine is distributed from scores of dispensaries, health centers and clinics which have been organized in the Amazon Basin and other rubber-bearing sections.

An ambitious plan to send at least 78,000 tappers into the Amazon region has been worked out by Joao Alberto Lins de Barros, Brazilian Coordinator of Economic Mobilization. Because of the curtailment of sea navigation between some northeastern Brazilian points, this army of workers must be moved by land. Rest places and food, as well as medicines and other essentials, will await the trekkers. The plan calls for moving approximately 50,000 tappers into the rubber-bearing area during 1943, at the rate of about 2,000 per week at the start.

Senor de Barros expressed the opinion that production of crude rubber in Brazil will reach 50,000 tons annually by the end of 1943. Of this amount, approximately 35,000 tons will be exported to the United States under the agreement with the Rubber Reserve Co. The figure of 50,000 tons per year agrees with the previous estimate made by Arthur de Souza Costa, Brazilian Minister of Finance, at the time of his recent visit to the United States.

The Coordinator of Inter-American Affairs recently pointed out that Brazil, the largest producer of crude rubber in the Western Hemisphere, has three tire factories with sufficient capacity to allow some surplus for the export market and that this surplus may cover the minimum needs of such neighboring countries as Bolivia, Chile, Uruguay, Paraguay, Argentina and Peru. Argentina, too, has three tire factories but very little crude rubber supply of her own.

Altogether, there are twelve tire factories in the other Americas, in additon to a number of other rubber goods factories. Besides the tire plants in Brazil and Argentina, Mexico has three plants, and Venezuela, Uruguay and Cuba one each. Other countries, including Chile, Peru and Colombia, either have plants projected or under construction to meet domestic requirements. Local consumption of rubber will in most cases be determined in part by how much rubber will be available for export. At the peak of the rubber boom (1910-12) rubber production in the Western Hemisphere passed 60,000 tons, but in recent years this tonnage hovered around 25,000 tons per year.

Cryptostegia News from Haiti

Although cultivation of cryptostegia is being undertaken in various sections of the Western Hemisphere, the most important project launched to date is the planting of some 100,000 acres in Haiti, as reported in our last issue. This project is under the supervision of Shada (Societe Haitiano-Americaine de Developpement Agricole).

Small amounts of cryptostegia rubber from mature Haitian vines have already reached the United States for testing. The quality of the rubber is said to be quite good, comparing favorably with rubber from Hevea and Castilla trees. Shada plans to employ a special tapping method to garner the latex from the cryptostegia vines. Bamboo will be utilized to make trellis-work for the vines and as they ramble over these supports the stems will be tapped for latex. Rubber in cryptostegia is present in both the leaves and stems.

Experimental plantings of cryptostegia are planned for Cuba, Puerto Rico, Jamaica, Costa Rica, Honduras and Mexico. In this country, test cultivations are already under way in Florida, Texas, Arizona and California. It is believed that the plant can be safely cropped after the first year and mature plants may yield approximately 250 pounds of rubber per acre.

First Report on Kok-Sagyz

One of the first comprehensive reports on experimental cultivation of *kok-sagyz* in the United States was released on December 1 by Dr. V. R. Gardner, director of the Michigan Experiment Station of the Department of Agriculture. Yields obtained at the station in East Lansing were among the largest of some twenty experiment stations to which the Department of Agriculture sent seeds last spring for trial plantings.

Planted in muck soil, the *kok-sagyz* produced about 5,000 pounds of latex-bearing roots per acre. The roots yielded 2 to 4% of rubber. First plantings, treated by the "stratified" method, germinated poorly and gave poor stands which were practically worthless. A sec-

ond batch of seed, however, was treated by a "modified vernalized" system and the germination was excellent, giving a perfect stand of plants. The "stratified" seed was held under snow and ice while the "vernalized" seed was soaked for 24 hours in cold water and then held in cold storage at 40° F. until planting time.

According to the report, the *kok-sagyz* was planted in rows 15 inches apart and did not make as vigorous a top growth as the ordinary pasture varieties, but developed a large root system. The rubber in the plant is contained in the roots. The cost of growing the plants was approximated at $100 per acre. The biggest expense in growing is in weeding the crop in the first few weeks after planting. The plant is slow in growth until its roots are established.

Rubber from French Africa

Interest has been revived in the production of rubber from roots of the *Landolphia thollonii* plant that grows in French Equatorial Africa, because of increased demand and a new, easier method of extracting the rubber.

The Landolphia is a low-growing shrub with roots the width of a man's finger, sometimes extending for long distances underground. After being pulled up, the roots are cut into lengths of about 15 inches, tied in bundles and processed according to the new method. The resulting chunks of rubber, containing from 10 to 20 per cent of bark impurities, are ready to be shipped.

The government has begun a campaign to instruct the natives in the new method of processing the rubber. With this improved system, it is believed a native can work out a kilogram of rubber from about 15 kilograms of roots, in 3 days. A production of around 5,000 tons of root rubber in 1943 is believed possible, says a private source. Government officials, however, place possibilities at only 500 tons.

News from the Far East

According to Japanese claims reported in the United States, the production of crude rubber in conquered territories is not being curtailed, since production has to continue to prevent general unemployment in the rubber areas. The Japanese claim that the excess rubber they are obtaining is being used for the production of gasoline, as previously reported in these columns. A factory is said to have been established near Kuala Lumpur for the transformation of Hevea rubber into gasoline by dry distillation and by using the low-boiling unsaturated hydrocarbons for alkylation and hydrogenation.

The same reports mentioned the fact that 400,000 laborers are now employed on the Sumatra and Malayan plantations; that 30% of the Dutch employees engaged in agricultural industries in Sumatra have been put to work again; that the Agricultural Experimental Station in Medan is now under Japanese management; and that this station is now directing the large rubber companies in Northern Sumatra, including the U. S. Rubber and Goodyear plantations.

NEW RULES AND REGULATIONS ISSUED ON RUBBER PRODUCTS

The number of reports required of manufacturers of mechanical rubber goods under Maximum Price Regulation No. 149 was considerably reduced by OPA with the issuance of Amendment No. 3 on December 2. This regulation sets manufacturers' ceiling prices on such products as belting, hose, packings, jar rings, etc., and the simplification was made in the light of experience during the past six months.

Other changes made in the same amendment, all designed to clarify and simplify the regulation, include the following:

1. In order to show more specifically what goods are covered by the regulation, three lists of items have been put into the regulation, one showing goods that are to be priced on the basis of conditions prevailing October 1, 1941; another showing goods whose prices are to be computed with January 5, 1942, as the base date, and a third illustrating the types of goods not covered at all by the regulation.

2. Any manufacturer of mechanical rubber goods who finds it impossible to compute maximum prices under methods now provided in the regulation will be permitted to suggest a price-determining method he believes is adaptable to such products.

3. There has been added a specific provision that once a manufacturer has determined his maximum selling price for an item, that price will stand as the ceiling for subsequent sales to buyers of the same class.

4. A manufacturer must keep records of all his regularly quoted prices on the base dates established by the regulation.

5. "Manufacturer" has been redefined to make sure that middlemen, who may make some minor physical alteration in the finished goods, are not included among those whose prices are covered by the regulation. "Regularly quoted price" has also been defined, as has the term "standard list item," in the interest of clarity.

Price ceilings for sales of industrial hose made with neoprene instead of natural rubber have been established in Amendment No. 4 to Maximum Price Regulation No. 149 (Mechanical Rubber Goods), issued by OPA on December 3. The new ceilings, which recognize higher manufacturing costs in the use of neoprene, were made necessary by the fact that effective December 1 certain types of hose must be made of synthetic rubber only.

Maximums for sales of neoprene hose by persons other than manufacturers are determined by adding to the seller's ceiling price for natural rubber hose the same dollars and cents differential that is permitted for manufacturers. There is no widening of the differential as the hose moves from one trade level to another.

Cost of neoprene is about three times that of natural rubber. Reflecting this, the manufacturers' ceilings on neoprene hose range from 11 per cent to 55 per cent above their prices for natural rubber hose, the spread depending largely on the quantity of neoprene used in the product.

Under the terms of Supplementary Order 1-227, issued on December 7, pertaining to pens and pencils, the use of crude and reclaimed rubber for erasers on both wood case and mechanical type pencils has been banned for the duration. The same order, which set forth manufacturers' quotas, based on 1941 production, prohibited the use of rubber sacs in fountain pens once present inventories are exhausted.

Rubber Footwear

Distributors of rationed rubber footwear who reached November 28—the deadline for unrestricted stocking—with short inventories because they had been selling more than their suppliers could restock them with immediately, were given a short "grace period" in which to arrange for necessary replenishments. The "grace period" was provided in Amendment No. 5 to Ration Order No. 6, which was issued on November 21.

Under the amendment, a distributor who wanted to increase his stocks after November 28 was required to file Form R-604 with his War Price and Rationing Board before December 5. Under the terms of the rationing order, distributors cannot secure rationed rubber footwear from their suppliers without presenting rationing certificates for the amount purchased.

Amendment No. 4 to Maximum Price Regulation 229 (Retail and Wholesale Prices for Victory Line Waterproof Rubber Footwear), issued by OPA on December 8, specifies new wholesale and retail ceiling prices for men's molded clogs manufactured by the Tingley-Reliance Rubber Corp. It also provides for the addition of taxes to the maximum prices, and the filing and posting of ceiling prices by retailers.

Rubber Heels

Under the terms of Amendment No. 3 to Maximum Price Regulation No. 200 (Rubber Heels, Rubber Heels Attached, and Attaching of Rubber Heels), issued by OPA on November 30, wholesalers of rubber heels were given until December 31 to pass on to shoe repairmen the amount of any Federal excise tax added to the price of the heels. The excise tax on rubber products was removed on

November 1 and OPA studies indicate that wholesalers who now have in stock rubber heels bought at a price including the tax will have ample time to resell them by the end of the current year.

The same amendment provides that the quality of sport heels may be designated by marking the container in which each unit is sold, rather than by putting a mold mark directly on the heels. This provision was necessary because many manufacturers produce several grades of sport heels in the same mold. This is standard trade practice.

LIMIT CONSUMERS OF RECLAIM TO 45-DAY WORKING INVENTORY

Consumers of reclaimed rubber are now limited to a 45-day working inventory under the terms of Supplementary Order M-15-b, as Amended, the amended order having been issued by WPB on December 1. The order previously limited inventories of all other types of rubber, but did not apply to reclaimed rubber. All rubber, including reclaimed, is under complete allocation control.

The order, as amended, does not apply to inventories in the hands of reclaimers. The inventory limitation on consumers was issued because of increased demand for high grade reclaimed rubber, plus the fact that a number of consumers have accumulated substantial inventories. An extract of the changes in M-15-b, pertaining to inventories, follows:

(c) (4) *Limitation of Inventories.* No person other than Rubber Reverve Co. shall purchase, accept delivery of or otherwise acquire any crude rubber, latex, reclaimed rubber or balata or products thereof, or any products of scrap rubber, in the form of raw materials, semi-processed materials, finished products or parts or subassemblies in quantities which shall result in such person having an inventory of such material or products in excess of a minimum practicable working inventory, taking into consideration the limitations placed by this order on the production of products made of crude rubber, latex, balata, reclaimed rubber and scrap rubber.

An inventory of crude rubber, latex or balata which can reasonably be expected to last more than sixty days, or of reclaimed rubber which can reasonably be expected to last more than forty-five days, shall be deemed to be in excess of a minimum practicable working inventory.

The limitation on inventories imposed by this paragraph (c) (4) and by 944.14 (Priorities Regulation 1) as amended shall not apply to inventories of reclaimed rubber held or acquired by persons engaged in the business of reclaiming rubber but who are not consumers of reclaimed rubber, it being contemplated that persons engaged in the business of reclaiming rubber (but not consumers of reclaimed rubber) may accumulate such inventories of reclaimed rubber as they may deem advisable.

New Prices Are Clarified

Because of the apparent confusion regarding the effective date of Amendment No. 3 to Revised Price Schedule No. 87 (Scrap Rubber) we have secured an official statement from OPA. This amendment, issued on October 26, set new ceilings on scrap rubber. The effective date of the order was October 31, but there were rumors and reports to the effect that the effective date had been postponed.

We are now advised by Robert F. Bryan, price executive of the Rubber Price Branch of OPA, that the effective date of the amendment is still October 31, but because of the need for expanding capacity of the reclaiming industry, the Rubber Reserve Co. has agreed not to raise prices, as authorized by the amendment, before April 1, 1943.

Mr. Bryan also advised that OPA is continuing its study of the earnings of the rubber reclaiming industry in order to determine whether the new conditions confronting the industry are having adverse effects on earnings. (EDITOR'S NOTE: While the reclaimers in general experienced satisfactory earnings in the first six months of the current year, most of them reported a reversal of the trend in the last six months. This was due largely to the restrictions on the use of reclaim introduced about mid-year).

IDLE TIRE PLAN TURNS UP 8,000,000 TIRES; ADDITIONAL TIRE NEWS

Close to 8,000,000 tires had been forwarded to the Government under the Idle Tire Purchase Plan up to the close of business on November 28, OPA reported on December 9. Of this total, 6,919,500 was made up of actual receipts at central warehouses, while at least 1,000,000 more were estimated to be in transit.

Sampling examinations of tires reaching warehouses indicate that about half of all those turned in are so badly worn or damaged they cannot be put into shape for resale. These tires will be scrapped and converted into reclaimed rubber. The rest are either usable as they are or can be made serviceable by repairs and recapping.

Originally, November 22 was set as the deadline for turning in idle tires in order to qualify for gasoline rations, but this date was later postponed to December 1 to coincide with the postponed date for the start of nation-wide rationing. It is now illegal for passenger car owners to use gasoline if they have more than five tires per car.

Expand December Quotas

Passenger car tire and tube quotas for December were expanded considerably over those of the previous month, the figures being 2,301,342 and 1,285,189, respectively. This includes recapping services. At the same time—November 28—OPA announced an increase in the truck tire quota in a move to take care of unsatisfied applications of eligible truck operators accumulated and carried over from preceding months. Truck replacement and recapping quotas for December were set at 489,749, compared with 376,168 for November.

The December quota of Grade I passenger car tires (best quality new tires available only for necessary replacements on cars that get a mileage ration of over 1,000 miles monthly) was set at 126,097, against 60,513 in November. The quota of Grade II tires (for cars that get a ration of between 560 and 1,000 miles monthly) was 368,000, against 134,470 in November. In addition to covering new tires with a retail list price less than 85% of the maximum price of standard Grade I tires, the definition of Grade II tires has been expanded to cover "factory seconds" so marked by the manufacturer, all new tires manufactured before January 1, 1938, and tires that have run less than 1,000 miles but have gone far enough to wear off the mold marks.

A quota of 920,000 was set for Grade III tires for December. This is a new category and includes used tires, recapped tires and new tires made of reclaimed rubber. These tires are intended as necessary replacements on cars with a mileage ration of 560 miles or less per month. The quota of recapping services for passenger car tires was put at 887,245 for December. The November quota, which included recapped tires as well as recapping services, was 1,090,206.

The December truck replacement tire quota of 340,229 is not strictly comparable with the 179,460 provided for November, since all replacement tires, recapped as well as new, are chargeable against the larger quota set for December. Only new tires come out of the comparable November quota. Recapping service quota for truck tires in December is 149,520, compared with 196,708 in the previous month.

New Authority Given OPA

With the approval of the Rubber Director, the Director General for Operations of WPB issued Supplementary Directive No. 1-Q on November 10. This

directive gives OPA the authority to ration tires, casings, tubes, retreads, tire materials, gasoline and passenger automobiles. Used passenger automobiles are included in the directive, but it was announced that there is no intention at present to ration used cars. With the directive, however, OPA has full authority to prevent the sale of a used car if it is equipped with tires obtained or mounted in violation of tire rationing regulations. It previously had this authority over new cars.

On November 12, at the direction of the Rubber Director, Ration Order 1A was issued covering the rationing of tires, tubes, recapping and camelback. Issued to carry out the recommendations of the Baruch Committee, the new ration order supersedes Supplementary Order M-15-c, as amended, and the Revised Tire Regulations, as amended. The order, along with that covering mileage rationing and gasoline regulations (Ration Order No. 5C), puts into practice the various recommendations made by the Baruch Committee including the following:

(1) Immediate institution of a tire replacement and recapping program with the allocation of reclaimed rubber for that purpose.

(2) Nation-wide gasoline rationing to hold the average annual mileage to 5,000 miles.

(3) Prompt and strict enforcement of a nation-wide speed limit not exceeding thirty-five miles an hour.

(4) Compulsory periodic tire inspection.

Four amendments have since been issued to Ration Order 1A, the first postponing the deadline date on idle tire turn-ins to December 1; the second exempting commercial vehicle operators until January 1 from actual acquisition of certificates of war necessity if application has been made to ODT and not refused; the third postponing the effective date for the United States to December 1 and for territories and possessions to March 1, 1943; and the fourth relaxing restrictions on inventory purchases by tire dealers, permitting use by the dealer of grade-marked ration certificates to purchase the same or lower grades of tires.

Ceilings on Reclaim Tires

Retail and wholesale ceiling prices for new passenger car tires of reclaimed rubber produced under WPB regulations were set by OPA on November 25 by the issuance of Amendment No. 6 to Revised Price Amendment No. 63 (Retail Prices for New Rubber Tires and Tubes) and Amendment No. 2 to Maximum Price Regulation No. 143 (Wholesale Prices for New Rubber Tires and Tubes).

The retail ceilings range from $8.45 for a 30 x 3½ tire to $17.80 for a 7.00-15 tire. The ceiling for a 6.00-16 reclaim tire is $13.25, which is approximately 22% below the ceiling of $17.11 for a first-line tire of the same size.

New Symbols Adopted for Government Synthetic Rubber

The various types of synthetic rubber being produced in the Government-owned and financed polymerization plants have been referred to generally in bulletins and correspondence issued by various Government agencies as "Government Synthetic Rubber" or simply "G.S.R." The Rubber Reserve Company has now agreed upon certain symbols to be used as designations for the various types of rubber being produced under the Government program, as follows:

New Symbol	*Source*	*Common Name*
GR-S	Styrene	Buna S
GR-P	Polysulfide	Thiokol
GR-M	Monovinyl-acetylene	Neoprene
GR-I	Isobutylene	Butyl

Effective immediately, the above symbols will be used by all Government agencies to designate the various types of synthetic rubber being produced. Rubber manufacturers are urged to familiarize themselves with the symbols which will appear not only in Government bulletins and correspondence but also in the technical literature of the industry.

Wholesale prices for tires of reclaimed rubber are not set in dollars and cents but on the basis of discounts from the established retail ceiling. The discount structure which existed during March, 1942, on the first line tires for both manufacturers and distributors is applied to the new maximum retail prices in determining maximum wholesale prices for sales in the normal distribution channels.

For instance, if a manufacturer's price on a first line tire to a dealer in March, 1942, was 30% less than the retail ceiling for that tire, his maximum price for the reclaim tire now is the retail maximum less 30%. The ceilings for all sales in trade channels between primary distributor and retailer are computed in the same way.

Maximum prices for sale of the reclaimed rubber tires by manufacturers to private brand owners are to be determined on a cost-plus basis. The cost is to be computed on the basis of wage rates and material prices as they existed in March, 1942, and overhead rates as they existed in November, 1941, a normal production period. The maximum which the manufacturer may charge the private brand owner is the cost thus computed, plus the mark-up over cost that was in effect between the manufacturer and the private brand owner during November, 1941.

Besides setting the maximums for the new reclaimed rubber tires, the amendment to R.P.S. No. 63 also inserts in the appropriate places the names of certain manufacturers and private brand owners inadvertently left out of lists set forth in the order as it was originally issued last January. It includes a list of ceilings for the tires of National Co-Operatives, Inc., and specific prices for two new truck tire brands of U. S. Rubber Co.

Tire Inspection Plan

Under the terms of mileage rationing, which went into nation-wide effect on December 1, all tires must be subjected to periodic inspection. The least cut or bruise will be immediately noted for repair. While the job of keeping tires in good running order exceeds in size anything of its kind ever before undertaken in this country, OPA expects it to go forward with less inconvenience to the average motorist than an ordinary car grease job. The cost of the inspection is so small that it represents a bargain to the car owner in terms of extended tire life.

OPA has established a standard inspection test. This includes the following eight steps:

1. Check of ration book and tire inspection record.
2. Listing of serial numbers of all tires on car.
3. Check for correct air pressure in each tire.
4. Recording of speedometer mileage reading on tire inspection record.
5. Check for bent rims and out-of-true wheels.
6. Check for cuts or breaks in tire sidewalls and treads.
7. Check general condition of tires for cuts, breaks and evidences of wear from badly aligned wheels, faulty brakes, unbalanced wheels, camber malalignments and excessive wear of kingpins, bushings and wheel bearings.
8. Obtain information from driver as to whether any tire has been injured inside and not repaired.

If tires pass this visual inspection the inspector signs the inspection record and the car may continue in operation. A fee for this service may be charged not to exceed 25 cents for each passenger vehicle when it is unnecessary to remove any tires. OPA estimates that each inspection will require about fifteen minutes.

Other Tire Actions

The services price regulation has been amended by OPA to conform to the provisions of the tire rationing regulations covering inspection of tires and the removal of tires incidental to inspection. The rationing regulations specify maximum charges which may be made for removal of tires when necessary to make adequate inspection. These charges conflict in some cases with maximum charges authorized by the services regulation. Amendment No. 6 to M.P.R. No. 165 (Services), issued on November 7, provides that in case of any such conflict

the specific charges authorized by the rationing regulations shall apply.

On December 5 OPA announced a modification of its mileage rationing regulations at the request of Rubber Director Jeffers to grant additional gasoline rations to traveling salesmen. While details were not fully worked out, the change will give these salesmen up to 65% of their last year's mileage, or a total of 8,600 miles a year, whichever is less.

Rubber Director Jeffers issued a request on December 13 asking the American people to act as 130,000,000 "committees of one" to rid the nation's streets, alleys and highways of broken glass, nails and other tire hazards. He suggested that the mayor of each municipality take the lead in this clean-up effort and that county commissioners take the initiative in rural areas.

OPA has issued three special bulletins for retailers on tires and tubes to date. These are Retreaded and Recapped Tires and Retreading and Recapping of Rubber Tires (Bulletin No. 6), Tire Dealers' Guide to Price Regulations (Bulletin No. 8), and Used Tires and Tubes (Bulletin No. 9). Copies of these retailer bulletins are available from regional and state offices of OPA and not from Washington. No charge is placed on the bulletins.

MISCELLANEOUS RULINGS

Various rulings and actions during the past months of interest to the rubber industry included the following:

Restrictions on the use of *titanium pigments* were removed on December 9 by WPB through the revocation of General Preference Order M-44. The revocation followed a study which indicated that there is about a nine months' supply on hand and domestic production will soon equal demand.

The allocation orders covering *methyl ethyl ketone* (M-169) and *butyl alcohol* (M-159) were amended by WPB on November 16 to provide for the use of the standard chemical allocation forms, PD-600 and PD-601. The action was taken by issuing a completely new version of each order.

Additional control over the purchase of *laboratory equipment* was put into effect on December 5 by WPB by the issuance of Limitation Order L-144, as Amended. The new order provides that no purchaser of laboratory equipment shall be permitted to acquire an item valued at more than $50 without securing an authorization for such purchase from WPB.

Sulfuric Acid, including oleum and spent acid, was placed under allocation under the terms of General Preference Order No. M-257, issued by WPB on December 6. However, deliveries of acid will not be prohibited subject to specific authorization, as is usually the case with allocation orders, but instead it will be possible under the order to issue directions when and as needed covering deliveries to be made and uses to be permitted or prohibited.

General Preference Order No. M-258, issued by WPB on November 17, puts *mineral oil polymers* under allocation. Under the order, "mineral oil polymers" means the resinous product produced by the polymerization of mixtures of unsaturated hydrocarbons (either the solid resin or solvent extended product) and does not include polystyrene, polyisobutylene, polyethylene, butadiene, or the copolymers of such materials.

Adjustable pricing for sales of *formaldehyde, lithopone, titanium pigments*, and *acetic acid* was established by OPA on November 26 to aid sellers and buyers preferring to make long-term contracts. The adjustable pricing was effected through the issuance of amendments to the maximum price regulations covering each material.

TUBELESS TIRE EXPERIMENTS DRAW CONSIDERABLE ATTENTION

Interest in tubeless tires has heightened considerably in recent weeks, particularly as the result of actual demonstrations held in various parts of the country. The Petroleum Industry War Council has reported that several hundred oil companies have equipped almost 1,000 cars with these tires for experimental purposes and that results of 2,000-mile wear tests will be available shortly. Approval of the tubeless tire idea has also been given by the House Commerce Committee.

The inventor who has received most attention on tubeless tires is John B. McGay, oil instrument manufacturer of Tulsa, Oklahoma. Mr. McGay's idea is being sponsored by the Tulsa War Transportation Committee. Mr. McGay is convinced that it is possible to dispense with inner tubes on cars with drop-rim centers and points to his own successful experiments.

In the McGay process, the casing and tube is removed from the rim, small holes and fabric-breaks are cold-patched, larger holes and breaks are patched and vulcanized, the bead is cleaned and smoothed, and the small corrugations which are often found around beads are ground off. A heavy valve is then inserted in the usual space provided, the casing is mounted on the rim, the outside tire bead is pressed tightly on the rim shoulder, and a blast of air is applied to snap the casing into place. From one to two quarts of a good tire-sealing fluid are put into the casing so as to seal small holes which may have escaped inspection. Washers and locknuts hold the valve in place.

Tire engineers are frankly skeptical of tubeless tire plans. They point out that only light commercial vehicles are equipped with the standard drop-center rim, that heavy trucks and buses run on special rims, tires and inner tubes, and that although there are some twenty-odd liquid cements on the market none of these cements is good enough to prevent deterioration and hence leakage of air. These engineers also point out that holes and bumps on dark streets and highways cause more damage to tires and hence loss of rubber than anything else; that air pressures, rarely gauged correctly, must be right if the fabric of the tubeless tire is not to break as it travels over bad pavements; and that there is no tube shortage at present.

The McGay plan differs considerably from the tubeless tire announced by Goodrich several months ago. This tire has an inner lining of rubber that seals the fabric from the air. The work done by Goodrich engineers indicates that if a thin skin of rubber, a fraction of the amount required for an inner tube, is vulcanized to the inside of the casing when the tire is made or when it is recapped the need for a tube or even of a sealing fluid is eliminated. This is not an entirely new idea, as the patent literature indicates. Mr. McGay is reported to be considering the addition of a thin inner lining for his process.

The *New York Daily News*, which is closely following the rubber situation, has recently conducted some experiments of its own with tubeless tires. On November 24 it conducted a demonstration of a tubeless tire invented by Pasquale Daddio, an employee of the U. S. Postal Service, some ten years ago. The Daddio tire is an ordinary casing with a thin rubber (or plastic) lining, similar to the Goodrich tire. In a 50-mile test run, the Daddio tire had four 4-inch nails driven into it. These four nails remained in the tire for 40 miles of the run and two of them were removed in the last 10 miles. The tire is said to have not lost an ounce of air pressure. The Daddio tire is held on the rim by internal air pressure and in addition has a heavy metal spring coil stretched inside the tire, around the circumference of the rim, to hold the tire beads in place during inflation.

Mr. McGay has estimated that the 135,000,000 inner tubes now in use on passenger cars and the 50,000,000 tubes in stock could be turned into the scrap rubber pile if the tubeless tire plan is universally adopted. Since each tube contains about 2.5 pounds of rubber, almost 70% of which is pure gum stock, it follows that more than 250,000 tons of reclaimed rubber could be provided from these tubes. After witnessing the McGay demonstration in Washington on December 2, Representative Boren (Oklahoma) indicated that he would seek House approval of the plan to reclaim the 185,000,000 inner tubes.

Akron is currently enjoying the largest employment record in its history. At the end of October, 1942, approximately 70,600 workers were employed, compared with 70,073 in 1920 when nine major companies were operating in the Akron area and with 41,700 a year ago. An additional 15,000 to 20,000 will be employed by the middle of 1943.

A.S.M.E. RUBBER GROUP HOLDS ITS ANNUAL MEETING

The Rubber and Plastics Group of the American Society of Mechanical Engineers held its annual meeting on December 3 at the Hotel Astor in New York City in connection with the annual meeting of the parent society. Two sessions were held, that in the morning being devoted to plastics and the one in the afternoon to rubber.

The first paper at the rubber session was "Data on Static and Dynamic Fatigue of Rubber," by Francis L. Yost of the U. S. Rubber Co. This paper was largely a review of the published literature on the subject, which is based on a series of experiments conducted by Dr. Yost and his associates, although some reference was made to more recent experiments on the static and dynamic fatigue of some of the synthetics. At the conclusion of this paper, J. H. Dillon, manager of the physics division of the Firestone Tire & Rubber Co., delivered a short resume of some work his company had done on the subject with Buna S.

Rubber Substitutes Discussed

The subject of "Rubber Substitutes" was next discussed by E. G. Kimmich, development engineer of the Goodyear Tire & Rubber Co. Mr. Kimmich presented a general review of some of the synthetics and substitute materials which have been adopted by the rubber industry, some from necessity and some from choice, and briefly described the advantages and disadvantages of these materials as compared with natural rubber. Among the materials he described were the bunas, neoprene, Thiokol, Butyl Rubber, ethyl cellulose, Norepol, and some of the newer resinous materials, such as that produced from sisal and phenolic resin which can be used for applications where oil and solvent resistance are major requirements.

Progress reports on plastics and rubber during the past year were then given by Dr. Gordon M. Kline of the National Bureau of Standards and E. F. Riesing of the Firestone Tire & Rubber Co. Mr. Riesing first explained that the report on rubber was to have been prepared by Dr. John Street, manager of Firestone's research department, and that in view of Dr. Street's recent illness it had not been completed in time for the meeting. He referred briefly to developments in bullet-sealing fuel tanks for airplanes and in efficient seals for such planes. The complete report, however, will appear in RUBBER AGE in the near future.

In discussing the progress of plastics during 1942, Dr. Kline said that most of the progress was in military products and therefore could not be revealed at present. He referred briefly to such new products as scabbard holders, pistol grips and machine gun handles, helmet liners, and the new M-52 fuses which now use plastic instead of copper. Brief reference was also made to the use of plastics for forming pads used in the aircraft industry to shape aluminum and other metals. Among other points mentioned by Dr. Kline was the creation of eight new testing procedures for plastics developed by the American Society for Testing Materials during the year. He also briefly reviewed the technical literature of the past year.

Three Papers on Plastics

Three papers were given at the plastics session, as follows: "Mechanical Tests of Cellulose Acetate. Part III," by William N. Findley, University of Illinois, Urbana, Ill.; "Physical Properties of Laminated Plastics," by R. W. Barber, St. Regis Paper Co., Trenton, N. J.; and "The Effects of Continued Heating on Mechanical Properties of Molded Phenolic Plastics," by D. Telfair, R. U. Haslanger and T. S. Carswell, Monsanto Chemical Co., Springfield, Mass.

Washington Appointments

DR. D. P. MORGAN, chemical consultant of New York City, who has been serving as executive of the chemicals section of the advisory committee to the Council for National Defense, has been appointed director of the Chemicals Division, WPB, succeeding DR. E. W. REID, who has been made director of the Commodities Bureau. J. W. REYNOLDS, who has been serving as assistant branch chief, has been named deputy director of the Chemicals Division.

DR. ROY A. SHIVE, of the Calco Chemical Division of the American Cyanamid Co., has joined the Rubber Reserve Co. where he will supervise production and development of chemicals for synthetic rubber. Before joining Calco in 1934, DR. SHIVE was associated with the Central Research Laboratories of the U. S. Rubber Co.

Dr. Roy A. Shive

NEW OFFICE OF RESEARCH IS ESTABLISHED BY W.P.B.

The organization of the Office of Production Research and Development, intended to insure rapid appraisal and prompt, effective use of new processes, materials, mechanisms and inventions in the production of war goods, was announced by Donald Nelson, head of WPB, last month. Dr. Harvey N. Davis, president of the Stevens Institute of Technology, has been named head of the new organization which will function as part of the War Production Board.

In his announcement, Mr. Nelson said the technical office will parallel in the production field the work already being done in regard to instruments of war by the Office of Scientific Research and Development, and that it was set up after consultations with Dr. Vannevar Bush, head of that agency.

Except for contracts connected with the rubber program, which will be referred to Rubber Director Jeffers for action, the new agency will make all WPB contracts for research and development work to be done by other governmental agencies, colleges and universities, commercial laboratories and corporations and others.

As director of the Office of Production Research and Development, Dr. Davis will serve as technical adviser to the chairman on engineering and scientific matters. It is his general responsibility to initiate such technical evaluation, research and development work as will in his judgment advance the war program.

Mr. Nelson emphasized that the work of the new office will not overlap or duplicate work being done by WPB's industry branches or divisions. Before undertaking any research or development program directly concerning a material or product which is under the jurisdiction of a branch or division, Director Davis will consult with the Director General for Operations and with the head of the branch or division involved.

Branches and divisions will keep the office advised of results of such research or developmental work as they have in progress.

Form Federal Telephone Corp.

The Federal Telephone and Radio Corporation has been formed as the result of the merger of the Federal Telegraph Co. with the International Telephone & Radio Mfg. Corp. The Intelin Division, which will continue to carry on research, development and manufacture of ultra high frequency cables, synthetic dielectric materials, high tension cable joints and terminals, and other related products, remains located at 250 South St., Newark, N. J. Other factory units are located at 200 Mount Pleasant Ave. in Newark and 1000 Passaic Ave. in East Newark. The principal electrical research laboratories of the company are located at 67 Broad St., New York City.

TALKS ON RUBBER FEATURE THIRD CHEMURGIC CONFERENCE

Rubber was very much in the limelight at the Third Mid-American Chemurgic Conference held in Cincinnati, Ohio, on November 17 and 18 under the auspices of the National Farm Chemurgic Conference, which maintains headquarters in Columbus, Ohio. Four papers on the subject of natural and synthetic rubber were presented.

Dr. Gustav Egloff, director of research of the Universal Oil Products Co., Chicago, discussed "Synthetic Rubber from Petroleum." He reviewed the Government's synthetic rubber program as now constituted and stressed the role played in that program by various petroleum fractions. Pointing out that butadiene is the key hydrocarbon in the production of synthetic rubber, he stated that there are over eighty different types of material which under some experimental conditions in the laboratory will produce low and high yields of butadiene. One of the primary methods of producing butadiene, however, will be by the catalytic hydrogenation of butylene. (EDITOR'S NOTE: This paper is reproduced in full elsewhere in this issue).

The problems of the synthetic rubber industry were covered by Dr. Robert V. Yohe, of the Synthetic Rubber Division of the B. F. Goodrich Co., in a paper on "Synthetic Rubber—Past, Present and Future." Dr. Yohe first traced the history of synthetic rubber, starting with the work of Michael Faraday, discussed some of its present uses, and then dwelt upon its possibilities in the future. In connection with present-day manufacturing difficulties, he stated that the manufacture of synthetic rubber runs the gamut of chemical engineering principles, including the liquefication of gases, emulsification, reaction under pressure, distillation, coagulation, washing, drying and all of the problems of handling liquids and gases. He also made reference to the fact that thousands of miles of piping running from ¼-inch to 42 inches in diameter had to be installed, billions of gallons of water must be used daily for steam and for cooling purposes, and 100 tank cars of 98.5% pure butadiene will be required daily.

In closing his address, Dr. Yohe stated that the course of synthetic rubber can be charted by the answers to the four following questions: (1) How long will the war last? (2) Will the Japanese destroy the rubber plantations when we drive them out? (3) If not, will the Government protect its investment with a tariff on natural rubber? (4) Can synthetic rubber be made at a cost low enough to compete with natural rubber? Although he did not attempt to answer these questions, Dr. Yohe did predict that synthetic rubber is here to stay, that it will be made more economically than is apparently possible on the basis of present knowledge, and that new uses will be found for it.

The position of agriculture in the synthetic rubber program was outlined in a paper on "Rubber from the Farm" by D. Howard Doane of the Doane Agricultural Service, St. Louis, Mo. Urging the greatly expanded use of agricultural products for the production of the raw materials needed for synthetic rubber, Mr. Doane pointed out that one bushel of corn or other similar crops makes between 5 to 6 pounds of butadiene and, therefore, if the 700,000 to 1,000,000 tons of synthetic rubber contemplated annually should be based on grain crops, it would require from 230,000,000 to 250,000,000 bushels of grain per year. Such a move, he stated, would make a fine postwar cushion for agriculture as well as for the country as a whole. He stressed the point that the United States has never had a depression when agriculture has been prosperous and that for every dollar agriculture gets the rest of the country gets seven dollars.

In summing up, Mr. Doane said that if, out of the final program, agriculture might have 10% of the gas, and a fair share of the rubber market, then A.A.A. subsidies could be abandoned, farmers could produce at capacity, and the best possible assurance against a postwar depression would be created.

Further Data on Kok-Sagyz

Some further information on the potentialities of *Kok-Sagyz*, the Russian plant now under experimental cultivation in various parts of the United States, was given by Dr. Paul J. Kolachov, director of research of Joseph E. Seagram & Sons, Inc., Louisville, Ky., in a "Progress Report on Natural Rubber." Pointing out that Russia now has some 2,500,000 acres of *Kok-Sagyz* under cultivation and is securing approximately 50% of its rubber requirements from the plant, Dr. Kolachov again stressed the point that whereas yields of from 150 to 200 pounds per acre were secured in Russia the younger soil of America, plus the use of improved machinery, should result in still greater yields per acre.

Coming Events

Dec. 18. New York Rubber Group, Christmas Party, Building Trades Club, New York City.

Dec. 18. Chicago Rubber Group, Christmas Party, Morrison Hotel, Chicago, Ill.

Feb. 18. Buffalo Rubber Group, Joint Meeting with Western N. Y. Section, A.C.S., Buffalo, N. Y.

Apr. 12-16. Spring Meeting, A.C.S., Indianapolis, Ind.

Apr. 30. Buffalo Rubber Group, Joint Meeting with Ontario Rubber Group, Niagara Falls, Ontario, Canada.

UNITED CARBON IS UPHELD IN BINNEY & SMITH SUIT

The claim of the United Carbon Company that it was not infringing on the Wiegand and Venuto patent (U. S. Pat. No. 1,889,429) covering a process of making carbon black pellets and the pelleted product was unanimously upheld by the Supreme Court of the United States in a decision handed down on December 7. The court acted on a petition filed by United Carbon. The original suit was brought by the Binney & Smith Company, which holds the Wiegand-Venuto patent.

The original suit, alleging infringement of the products claims, was brought by Binney & Smith in the U. S. District Court for the Northern District of West Virginia in 1939. In February, 1941, the district court handed down its decision holding the patent invalid and not infringed. In its decision, the court stated that there were recognizable differences between the pellet blacks sold by the two companies and that the patent was lacking in novelty.

In January, 1942, on an appeal by Binney & Smith, the Circuit Court of Appeals for the Fourth Circuit, after reviewing the case, handed down a decision holding the product claims both valid and infringed, thus reversing the decision of the district court. On May 14, 1942, the Supreme Court granted a review of this decision on a writ of certiorari filed by United Carbon and its decision in effect upholds that of the district court.

According to the United Carbon Co., the peculiar process of Wiegand and Venuto involving the use of two liquids and abandoned in 1932 was not involved in the case. Since that date practically all carbon black manufacturers have devised processes of their own involving either one liquid or none, by means of which practically 90% of all carbon black is now treated.

Elastic Vinylite Resin Yarn

The American Viscose Corporation recently announced the development of a new synthetic vinylite resin yarn with elastic properties possessing many of the characteristics of rubber and which can be used to make numerous articles heretofore dependent solely on rubber yarn. The new yarn, in fact, is said to be superior to rubber in certain properties, particularly in its resistance to sunlight and to the deleterious effects of tropical heat and humidity. It is not affected by body acids. At present, the entire output of the vinylite resin yarn is restricted to use on military products, but it is pointed out that it can replace rubber in elastic webbing, tapes and cords, girdles and brassieres, surgical stockings, supporters, and suspenders. A variation of the product can also be used in the manufacture of many articles now made of sponge rubber.

RHODE ISLAND RUBBER CLUB HEARS TALK ON BUNA S COMPOJNDS

A talk on "The Compounding of Buna S," delivered by Walter J. Geldard, of the Naugatuck Chemical Division of U. S. Rubber Co., was one of the highlights of the Winter Meeting of the Rhode Island Rubber Club, held at the Narragansett Hotel in Providence, R. I., on December 4. Other features included the election of officers and the distribution of lucky number prizes, most of which were purchased with funds from the club's treasury.

The election resulted in the following new officers: *President*, L. K. Morrow (Anaconda Wire & Cable); *Secretary-Treasurer*, Owen Lowe (Davol Rubber); *Executive Committee*, L. K. Youse (Firestone Rubber & Latex), S. J. Lake (Respro), Daniel Rhee (Carr Mfg.), M. J. Linn (Xylos Rubber), J. M. Scott (Henry L. Scott Co.), H. E. Murch (Goodyear Footwear), F. S. Bartlett (U. S. Rubber, Bristol), W. Linnell, Sr. (Collyer Insulated Wire). The Nominating Committee was headed by E. L. Hanna (Davol Rubber) as chairman, and included John Marshall (Collyer Insulated Wire), J. M. Scott (Henry L. Scott Co.), and Fred Fitzpatrick (Respro).

Mr. Geldard delivered his talk immediately following dinner. He gave a short outline of the composition and manufacture of Buna S and then reviewed present knowledge concerning milling in both laboratory and factory equipment, the use of pigments and softeners, and the types of acceleration which may be used in compounding.

In connection with laboratory milling it was pointed out that the dispersion of pigments, particularly carbon black which is necessary for developing tensile strength, and of sulfur, is more difficult than with crude rubber and is very important. Data were given to indicate the effect of poor dispersion of sulfur and methods for overcoming poor results obtained from this defect. The premastication of Buna S is also important for subsequent milling operations and the speaker warned against the use of high temperatures for this breaking down operation as detrimental to the final physical properties of the compounds. Buna S stocks may be mixed in Banbury mixers using either high or normal rotor speeds and the best results are obtained by using a premasticated Buna S.

Action of Carbon Black

It has been well established that in order to obtain high tensiles in the final product some form of carbon black must be used. The action of various types of carbon black was described and reference made to some of the recent published literature on the effect of carbon blacks of various size and types in compounding Buna S. Since the proper carbon black is very important to such factors as heat build-up and flexing, Mr. Geldard emphasized the need of a careful selection of the proper type for best results.

In the non-black pigments, very few have proved capable of developing high tensiles, and where it is necessary to compound stocks to the exclusion of carbon black because of color or particular electrical properties it is necessary to study the best results to be obtained from each of the non-black pigments.

Under the heading of softeners and tackifiers it was brought out that after testing over sixty types of recommended materials there is still no single product which will give satisfactory tack for many building operations. The most effective are probably the heavier coal and pine tar derivatives and some natural resins.

Accelerators for Buna S

In the discussion on accelerators for use in Buna S it was pointed out that all of the commercial types are effective in their ability to accelerate vulcanization. In the presence of certain pigments, such as carbon blacks and clays, it is well known that the amines and aldehydeamines are not as effective as the thiazoles and thiurams. In the case of the latter type, the action in Buna S is considerably different than in natural rubber.

Most compounders are aware of the critical character of the thiuram accelerators in curing crude rubber products. In Buna S the results are quite the opposite, the vulcanizates being characterized by high tensiles and uniform modulus and elongation over a reasonably long range of cures. The characteristic is important and valuable for many types of compounds. In addition the thiuram type of acceleration promises to be less scorchy than the amines or thiazoles and therefore permits use of higher acceleration for fast cures.

The amount of sulfur needed in Buna S compounding is somewhat lower than in crude rubber. Satisfactory stocks may be made however with 3% of sulfur with a corresponding reduction in accelerator. The normal results under these conditions are uniformly good. Where the product is exposed to excessive heat or flexing in service it has been found that the lower sulfur ratios maintain better physical properties. In this respect the compounding of Buna S parallels our experience with crude rubber.

In the matter of laboratory tests which can be applied to Buna S compounds it was pointed out that most of the standard tests are applicable with the exception of the T-50, heat built-up and flexing tests. Because of the basic characteristic of Buna S vulcanizates to retract slowly after extension the T-50 test is worthless; the heat build-up test must be modified to minimize this characteristic and the flex test which depends on extension and contraction is not reliable. In the latter test some form of a groove sample in which standard cuts can be made, followed by bending and measurement of the growth of these cuts, has proved most satisfactory.

In conclusion, Mr. Geldard emphasized that most of the laboratory and development work done to date has been for the production of military tires. With the extension of the use of Buna S to all other products a great deal of development work must be done but there is every indication that most products can be satisfactorily worked out following the experience of the tire compounders and some of the basic principles mentioned earlier.

A fairly satisfactory insulated wire has been produced in C.V. machines although the speed is reduced and the physical characteristics are not up to present specifications. Other products such as footwear have been produced after the compounder has worked out methods for decreasing the high shrinkage characteristics of Buna S compounds which apparently can be done by the use of appropriate plasticizer and a sufficiently high loading of pigment to obtain smooth stocks with low shrinkage.

There would seem to be less difficulty in compounding for molded articles and it was emphasized that the major problem for many rubber shops would be in the processing and preparation of the materials for curing in view of the difficulties with dispersion, shrinkage, and general lack of tack.

Offers New Washington Service

Warren S. Lockwood has resigned as an administrative assistant of the Rubber Reserve Co., in which post he has served since last June, and has opened an office in the Shoreham Building, Washington, D. C., where he will represent a group of selected rubber companies primarily on problems relating to raw material supplies, allocations, priorities, etc. He is limiting the number of rubber companies represented to one company in each major branch of the industry and has already been appointed by companies in the mechanical goods, footwear, hard rubber, wire and cable, and reclaiming fields. In addition, he has been appointed Washington representative of the Rubber Trade Association of New York, Inc. Mr. Lockwood has had considerable experience in the rubber industry, both here and abroad. For a number of years he was in the foreign service of the Department of Commerce, serving in Singapore, Batavia and London. He returned to this country several years ago as the American representative of the British Rubber Publicity Association and later joined the staff of the Rubber Manufacturers Association as chairman of the footwear, hard rubber and rubberized materials division, leaving the Association in June, 1941, to join the Rubber Reserve Co.

OFFICE OF THE RUBBER DIRECTOR

Rubber Director—William Martin Jeffers.
Executive Assistant—D. O. Churchill.
Special Assistants—Glen R. Ward and Richard Smith.
Deputy Rubber Director—Col. Bradley Dewey.
Special Assistant—Morehead Patterson.
Assistant Deputy Rubber Directors—L. D. Tompkins (operations), E. B. Babcock (technology and specifications for industry uses), R. P. Dinsmore (research and development of synthetics), and Frank R. Creedon (plant construction).
Special Advisors—Dr. E. R. Gilliland and W. L. Campbell.
Manager of Priorities—S. P. Dorsey.
Special Consultants to Mr. Tompkins—Dr. H. S. Rogers, A. L. Freedlander, Willard Helburn, and E. E. Ferebee.
Legal Advisors—B. P. Holland and Thomas Lynch.
Educational Branch—Dr. H. E. Simmons and John M. Ball.
Technical Consultant Section—E. B. Busenberg (reclaimed rubber), V. A. Cosler (neoprene), A. H. Nellen (tires and tubes), C. W. Sanderson (Thiokol and Norepol), and Ralph Wolf (Butyl).
Priorities Officer—Robert T. Williams.
Assistant—Caspar Wister.
Review Unit of Priorities Section—L. H. Ross, G. E. Perry, and Ellsworth Vines.
Analysts of Priorities Section—J. E. Hicks, Sr., Charles A. Dubocq, E. P. Jecusco, George Lawrence, Edward Gehres, M. J. Span, Louis P. Best, E. D. Wooldridge, and E. L. Schmock.
Administrator, PRP Processing Unit—Smith Johnson.
Acting Manager, Allocation Section—R. E. Hengren.
Assistant—F. X. Finnigan.
Supervisor, Appeals Unit, Allocation Section—F. C. Holmes.
Assistant—Edward Sternberg.
Liaison Section—Tom Roberts, B. E. Pollak and G. R. Toney.
Technical Section—C. S. Reynolds (Administrator), Robert C. Dabney, V. R. Grainger, B. F. Hollister, Walter Juve, Arthur Nolan, J. C. Swift, S. C. Compher, and H. Brunner.
Manager, Statistical Section—Harold L. Flanick.
Assistant—Robert Given.
Synthetic Rubber Allocation—W. H. Peterson.
Administrative Officer—Laurence H. Boerner.
Representative, U.S. Army—Capt. R. R. Wieland.
Representative, U.S. Navy—Lt. Leonard K. Firestone.

Note: Mr. Jeffers and his executive and special assistants make their headquarters in the Social Security Building. All other members of the Office of the Rubber Director are located in the New Municipal Building, 4th and D Streets, N.W., Washington, D. C.

RUBBER RESERVE COMPANY

Chairman of the Board—Jesse H. Jones.
President—Howard J. Klossner.
Special Assistants—China R. Clarke and Douglas H. Allen.
Assistants—R. B. Bogardus, T. A. O'Brien and James C. Roberts.
Vice-Presidents—R. D. Young, J. W. Bicknell, Henry A. Mulligan and Stanley T. Crossland.
Secretary—M. C. Mulligan.
Treasurer—W. C. Beck, jr.
General Counsel—Claude E. Hamilton, Jr.
Chairman, Buying Committee—A. L. Viles.
Vice-Chairman, Buying Committee—A. D. Moss.
Chief, Administration Division—William H. Sullivan.
Technical Consultants—Richard J. Dearborn, Rufus L. Savage, L. T. Carlson, Frederick M. Pyzel, and Henry F. Palmer.
Consulting Engineers—John W. Livingstone and Alfred Johnson.
Purchasing Specialist—L. W. Proctor.
Distribution Specialist—Richard C. Cooke.
Chief Procurement Specialist—Alexander J. Lockwood.
Administrative Assistants—Richard Baybutt, William G. McCauley, Howard C. Bugbee, John D. Farnham, George W. Sniffin, Bernard B. Carlin, Harland J. Corson, E. B. Murphy, Robert G. Walker, and A. B. Merritt.

Note: The Rubber Reserve Co. maintains headquarters at 811 Vermont Ave., N.W., Washington, D. C.

RUBBER SECTION, OFFICE OF CIVILIAN SUPPLY, WPB

Chief—Donald R. Longman.
Associate Chief—James E. Skane.
Automotive Unit—John Boll, A. G. Richtmyer, H. H. Slevin, Donald A. Macdougall, George Bearshaw.
Non-Automotive Unit—Edward J. Casey, Hugh A. Carroll, Curtis E. Anderson, Joseph T. Frizzell.
Synthetic Unit—J. E. Hutchman, W. A. Appeltofft, R. R. Wotring, Noel Lanham.
Supply and Requirements Unit—William Fallon, Morris Moses, Herman Merritt, A. L. Foulger.

Note: The Rubber Section, Office of Civilian Supply, War Production Board, maintains headquarters in the Social Security Building, 3rd and Independence Ave., N.W., Washington, D. C.

Lightbown Addresses Ontario Group

I. Lightbown, of Stanco Distributors, Inc., was the principal speaker at the meeting of the Ontario Rubber Section of the Canadian Chemical Association, held at the University of Toronto in Toronto, Canada, on October 14. Mr. Lightbown delivered an address on the compounding, processing and curing of Butyl rubber, discussing the advantages and disadvantages of this material as compared with natural rubber and other synthetic rubbers. The Standard Oil film "Bouncing Molecules" was also shown. Approximately 100 members and guests were in attendance. The Ontario Rubber Section also held a meeting on December 3 at which Dr. I. Drogin, director of research for the United Carbon Co., delivered a talk on the reinforcement of synthetic rubbers with carbon black. A full report on this meeting will appear in the next issue.

Chicago Group Hears Crosby

J. W. Crosby, sales manager of the Thiokol Corp., Trenton, N. J., was the principal speaker at the meeting of the Chicago Group, Rubber Division, A.C.S., held on November 27 in the Old Town Room of the Sherman Hotel in Chicago. Approximately 150 members and guests were in attendance. Mr. Crosby gave an instructive talk on the "Outstanding Properties of Various Types of Thiokol" and illustrated his talk with some excellent slides. Dr. J. C. Patrick, director of research for the Thiokol Corp., and inventor of Thiokol itself, was also present at the meeting. Following the talk the two new Standard Oil motion pictures, "Bouncing Molecules" and "Rubber Goes Synthetic", were presented. After the meeting, a number of the members and guests visited the National Chemical Exposition which was also being held at the hotel.

Buffalo Meets on February 18

The next meeting of the Buffalo Group, Rubber Division, A.C.S., will be held in Buffalo on February 18. It will be a joint meeting with the Western New York Section of the parent society and the hotel at which it will be held will be announced shortly. Dr. D. S. Le Beau, of the Massachusetts Institute of Technology, who has been working closely with Dr. Ernst Hauser on problems of the manufacture and reclaiming of synthetic rubber, will speak on "Wartime Rubber." A Kodachrome movie on the manufacture of steel, prepared by the U. S. Steel Co., will also be shown. The next International Meeting of the Buffalo Group, which is held in conjunction with the Ontario Rubber Section of the Canadian Chemical Association, has been scheduled for April 30. As usual, it will be held in Niagara Falls, Ontario, Canada.

RUBBER SAFETY SECTION NAMES OFFICERS FOR 1942-43 SEASON

John L. Grider, of the Butler, N. J., plant of the American Hard Rubber Co., and Paul Van Cleef, of Van Cleef Brothers, Chicago, were elected general chairman and vice-chairman in charge of program, respectively, at the recent annual meeting of the Rubber Section of the National Safety Council, held in Chicago. John E. Lovas (U. S. Rubber, Passaic) was elected secretary and Roland Kastell (U. S. Rubber, N. Y.) was named news letter editor.

The new committee chairmen include the following: *Engineering*, Thomas F. Boyd (Manhattan Rubber); *Health*, Dr. W. S. Ash (U. S. Rubber, Detroit) and Dr. J. Newton Shirley (Arrow Mutual Liability Insurance Co.); *Membership*, Glen D. Cross (Firestone).

The following were selected as members at large: E. W. Beck (U. S. Rubber, N. Y.), R. A. Bullock (Corduroy Rubber), Ralph S. Farnum (U. S. Rubber, Detroit), Oliver Hopkins (U. S. Rubber, Providence), C. F. Horan (Hood Rubber), J. M. Kerrigan (U. S. Rubber Reclaiming), W. H. MacKay (Dunlop Tire), Urban L. Moler (Inland Div., General Motors), R. W. Morse (Firestone), William Spanton (American Hard Rubber, Akron), and R. M. Weimer (Dayton Rubber).

New Patent on Cellulose Cord

Another patent (U. S. Pat. No. 2,302,082) relating to the production of tire fabric from cellulosic yarn has been granted to the Celanese Corporation of America. According to this latest patent, fabrics or cords containing yarns or filaments of cotton or regenerated cellulose are treated with phthalic anhydride under such conditions that the outer surface only of the materials is esterified. This treatment not only esterifies the surface of the yarns or filaments, but also imparts to them an increased affinity for rubber, causing the tire cord or fabric to be embedded in the rubber without the formation of air spaces between the cord and the rubber, thus resulting in a better union. The first patent issued to the company—U. S. Pat. No. 2,291,700—was described in our September, 1942, issue.

Announces New Substitutes

Disclosure of the development of two new substitute materials for rubber, one suitable for the manufacture of canning rings and the other for the production of braided hose, packing and molded goods in general, was recently made by the Detroit Gasket & Manufacturing Co., Detroit, Mich. Little information regarding the base of these materials has been forthcoming to date other than that the closure sealing material is "a flexible, thermoplastic, resinous composition" while the other has a "resin base." Since the Detroit Gasket & Manufacturing Co. is busy turning out special products for the automotive and aviation industry it cannot undertake to produce either of the two new materials except in a limited way and therefore has offered to make either or both processes available to other manufacturers under "mutually satisfactory arrangements."

Substitute for Sponge Rubber

A new substitute for sponge rubber is reported under development at the plant of Bauer & Black, manufacturers of surgical adhesives and dressings, in Chicago. The new product, as yet unnamed, is said to have been accidentally discovered by Dr. H. M. Strong and Marguerite Naps, chemists at the plant, while conducting experiments designed to discover a replacement or substitute for rubber adhesive. Upon combining one of the resins developed by the Northern Regional Research Laboratory of the Department of Agriculture at Peoria, Ill., with some acids, the composition foamed up out of control during an attempt at vulcanization. The two chemists succeeded in controlling the foam and the new substitute is said to have been the result. Dr. J. F. Ziegler, director of research for Bauer & Black, has stated that the new sponge rubber substitute looks and reacts almost exactly like natural rubber. He said that while it was slightly inferior to rubber in flexibility and compressibility at normal temperatures, it was superior to the natural product in these characteristics at lower temperatures.

Organizes New Plastics Division

The Plastic Materials Division has been organized by the B. F. Goodrich Co., Akron, to supersede the Synthetic Sales Department, under which activities of this type have been grouped. Key personnel remains the same, with J. R. Hoover acting as division manager and S. L. Brous directing the technical service and distribution of raw plastic materials. Sales of finished plastics products made by the new division will be in the hands of L. H. Chenoweth.

EARNINGS OF RUBBER FIRMS SHOW CONSIDERABLE INCREASE

The combined net profits of fifteen leading rubber companies for the year of 1941 amounted to $156,000,000, an increase of $88,000,000 over the combined earnings of the previous year, according to a report issued on November 13 by the Securities and Exchange Commission. The increased earnings were said to reflect the defense program of the United States, lend-lease shipments, and the increased buying power of retail consumers.

The report, one of a series issued each year on domestic corporations filing financial statements with the Commission ,in accordance with the law, also showed that total sales of the fifteen rubber companies reached $1,244,000,000 in 1941 as compared with $857,000,000 in 1940. Combined dividends amounted to $27,000,000 as against $21,000,000, while total assets rose from $785,000,000 in 1940 to $891,000,000 in 1941. Surplus of the companies at the end of 1941 totalled $181,000,000, an increase of $23,000,000 over 1940.

The companies included in the report were: U. S. Rubber, Goodrich, Goodyear, Firestone, Brown Rubber, Baldwin Rubber, General Tire, Seiberling Rubber, Kleinert, Hewitt Rubber, Norwalk Tire, Faultless Rubber, Dayton Rubber, and Lee Tire.

Additional "E" Awards Made

The joint Army-Navy "E" award, presented in recognition of outstanding work in the production of vital war materials and equipment, has been received in recent weeks by several additional companies in the rubber industry, including the Neoprene Works of E. I. du Pont de Nemours & Co., the Acushnet Process Co., A. Schrader's Son Division of the Scovill Mfg. Co., and the Union Asbestos & Rubber Co. In all cases, the presentations were made by prominent military officers and appropriate ceremonies were held. Lowell Thomas, noted radio commentator, officiated at the Schrader affairs.

Rubber Chemicals Production: 1941

Production and sale of certain rubber chemicals in 1941, compared with 1940, as compiled by the U. S. Tariff Commission, follow:—

	Pounds				
	Production		Sales		Value
	1941	1940	1941	1940	1941
Coaltar, total	40,575,264	37,139,394	31,255,255	28,024,769	$15,034,773
Accelerators, total	15,210,986	16,736,874	10,805,315	12,998,019	5,158,692
Butyraldehyde, aniline	506,076	482,964	296,545	.....	200,894
Diphenylguanidine	2,135,092	1,448,504	1,708,628	1,279,701	563,622
Thiocarbanilide	349,055	404,838	.....	.....	.....
All other	12,220,763	.....	8,800,142	.....	4,394,176
Antioxidants, total	25,364,278	20,402,520	20,449,940	15,026,750	9,876,081
Diphenyl-p-phenylenediamine	1,618,294	1,281,841	979,005	.....	741,191
All other	23,745,984	.....	19,470,935	.....	9,134,890
Non-coaltar, total	19,082,521	16,915,139	17,233,435	15,353,009	4,866,893
Accelerators—					
Tetramethylthiouram sulphide and disulphide	832,366	567,517	805,621	433,397	1,421,550
Zinc diethyl dithiocarbamate	82,916	51,775	63,801	.....	99,285
All other	18,167,239	.....	16,364,013	.....	3,346,058

LOCAL RUBBER GROUPS HOLD DECEMBER MEETINGS

Practically all of the local rubber groups throughout the country are scheduled to hold meetings or annual Christmas parties within the next few days. Some meetings have been held within the past few days and reports on these meetings, as well as those to be held, will appear in full in our next issue. The dates and features of the meetings appear below, alphabetically by group:

Boston Rubber Group was scheduled to meet on December 11. The program included a paper on "The Reinforcement and Vulcanization of Buna S", by Charles R. Haynes of the Binney & Smith Co., New York, and a talk on "Wanderings in the Peruvian Andes, the Land of the Incas," by Harry J. Robinson, noted explorer.

Buffalo Rubber Group will hold its third annual Christmas Party at the Hotel Westbrook in Buffalo on December 16. Other than the election of officers, the meeting will be devoted to entertainment and good-fellowship.

Chicago Rubber Group will hold its annual Dinner Dance and Show in the Terrace Casino of the Morrison Hotel in Chicago on December 18. Following the pattern of previous years there will be no business session.

Detroit Rubber & Plastics Group was scheduled to meet on December 11. This was the annual Christmas Party but in addition to the distribution of prizes a paper on "Man Power" by M. A. Clark, district director of the War Manpower Commission, was to have been given.

Montreal Rubber Group (Rubber & Plastics Division, Montreal Section, Society of Chemical Industry) was to have held a meeting on December 16 at the Ritz-Carlton Hotel in Montreal. Dr. H. I. Cramer, of Sharples Chemicals, Inc., and secretary of the Rubber Division, A.C.S., was scheduled to deliver his lecture on "Synthetic Rubber." This was to have been a joint meeting with the Montreal Section of the parent society.

New York Rubber Group will hold its annual Christmas Party at the Building Trades Club in New York City on December 18. In addition to the usual distribution of prizes to holders of lucky numbers, the program will feature "30 Minutes of Streamlined Magic" by H. Walter Grote of the United Carbon Co. Election of officers will also be held.

Ontario Rubber Group was scheduled to hold a meeting on December 12 at the University of Toronto in Toronto, Canada. Dr. Cramer was also scheduled to give his lecture on "Synthetic Rubber" at this meeting.

New York Belting & Packing Co., Passaic, N. J., has issued a 24-page pocket manual on the care of industrial rubber products under the title of "How To Get Longer Life from Mechanical Rubber Goods." Copies are available on request.

Develop "Polar Grip" Tire

The "Polar Grip" tire, featuring an entirely new type of tread that will improve the operation of American war planes in icebound territory, has been

announced by the Firestone Tire & Rubber Co., Akron. The tire has a soft, crepe rubber tread that gives a much more positive grip on snow and ice than the conventional airplane tire, according to Firestone engineers. The many flexible, finger-like projections of the soft tread grip firmly on snow and ice providing a firm, sure braking action and a resistance to side skidding.

Set Ceiling on Tire Yarns

With five rayon manufacturers about to start large scale production of the new special rayon yarns for automobile tire cord and parachute shroud lines, OPA announced uniform cents-per-pound ceiling prices for the various deniers on December 11. The ceilings are contained in Amendment No. 3 to Maximum Price Regulation No. 167. A maximum price of 43c per pound for sales of the yarn to be used chiefly in tire cords in the place of yarn made from long staple cotton is set. This is a 1100-denier viscose process high tenacity continuous filament yarn. The 43-cent price per pound is based upon the March ceilings of two producers and estimates of production and plant conversion costs submitted by the other producers.

New Shock-Absorbent Material

A special shock-absorbent material used as padding in turrets and as tank linings, is now being manufactured for the military services by the U. S. Rubber Co. The material is 100% cattle hair felt which is die-cut into shapes necessary to fit inside the tank, and the die-cut pieces sprayed with synthetic rubber. The material is said to give considerable protection to the men operating the tanks.

NEED FOR RIGID AIRSHIPS REAFFIRMED BY LITCHFIELD

The continued need for rigid airships, either as wartime carriers of fighting planes or peacetime carriers of American freight, was reaffirmed recently by Paul W. Litchfield, chairman of the board of the Goodyear Tire & Rubber Co., Akron, in an article in a recent issue of the *Aeronautical Engineer Review*. "It is our belief," wrote Mr. Litchfield, "that as an aircraft carrier the large rigid airship will become indispensable for quickly and efficiently carrying our fighting planes to distant combat zones."

The Goodyear Tire & Rubber Co. is continuing fundamental areodynamic and structural research in the field of lighter-than-air in anticipation of the time when large rigid airships will be constructed to fulfill their part in the present war or to meet the need for long-range cargo carriers, the board chairman said.

Goodyear, now producing giant nonrigid patrol ships for the navy in quantity and in the midst of the greatest revival of airship building since the days of the Akron and Macon, has contributed many ideas and suggestions for the present advancement of heavier-than-air as well as lighter-than-air crafts.

In anticipation of the day when larger and stronger structures will be needed, Goodyear engineers have developed artificially aged stainless steels having extremely high strength properties, Mr. Litchfield revealed.

Along manufacturing and processing lines, he stated that various developments made by his company have added greatly to the knowledge of forming, working, fabricating and heat-treating of aluminum alloys and many procedures were established about which there had been no previous technical information.

The Goodyear board chairman told of the rubberized "stay tight" fabric which his company made in the early days and which "contributed toward a more efficient wing covering which has now evolved into the modern nonrigid envelope structure."

Early work in rubberized crash-proof fuel tanks contributed to the development of the present highly efficient bullet sealing tanks, he said.

New Group Holds Initial Meeting

The newly-organized rubber group in the Bay District of California, which embraces San Francisco and Oakland, held its first official meeting in Oakland on Tuesday, December 8. Herman Jordan (DuPont) was elected chairman; L. C. Boller (Pioneer Rubber), vice-chairman; and G. B. Farwell (Reliance Rubber), secretary-treasurer. R. E. Morris, rubber technologist of the rubber laboratory at the Mare Island Navy Yard, was the principal speaker. Memberships are invited by the group and those interested are urged to communicate with Mr. Farwell.

NAMES IN THE NEWS

T. SPENCER SHORE, vice-president and treasurer of the General Tire & Rubber Co., Akron, who has been serving as chief of the Bureau of Industry Advisory Committees of WPB in Washington, has resigned his Government position as of December 15 and is returning to active duty with General Tire.

HARRY E. HUMPHREYS, JR., vice-president, director and chairman of the finance committee of the U. S. Rubber Co., has been elected a director of the Chemical Bank and Trust Company of New York. He is also a director of the Dominion Rubber Co., Ltd., and Latex Fiber Industries, Inc.

ESSE E. ROUTH, general manager of sales for the Mathieson Alkali Works, Inc., since 1928, has been elected vice-president and director of sales of that company, succeeding JOHN A. KIENLE, recently retired. D. W. DRUMMOND has been appointed general manager of sales.

G. H. DUNLAP, associated with the textile field since 1928, has been appointed as associate to JOHN T. WIGINGTON, director of the textile research division of the Cotton-Textile Institute. He will make his headquarters at the Institute's research office, which is located in the Textile School at Clemson College, Clemson, South Carolina.

T. G. "TED" SULLIVAN, until recently manager of the rubber and plastics division of the Harmon Color Works, Haledon, N. J., and previously associated with Vansul, Inc., has joined the staff of Foster D. Snell, Inc., Brooklyn, N. Y., where he will head up a rubber division.

W. B. WOOLCOCK, associated with the B. F. Goodrich Co. for more than 30 years, has been named manager of the mold design department of the industrial products division at Akron.

JAMES A. MERRILL, research chemist of the Goodyear Tire & Rubber Co., Akron, was one of ten American "production soldiers" honored by President Roosevelt at the White House on December 10 for outstanding contributions to the war effort. He received the Citation of Individual Production Merit for his development of bullet-sealing fuel tanks which resist aromatic fuels.

C. H. PETERSON, formerly associated with the tire department of the Ford Motor Co., and prior to that with the Firestone Tire & Rubber Co., has joined the Pennsylvania Rubber Co., Jeannette, Penna., as assistant production manager.

C. C. SIMPSON, who has been serving as executive secretary of the National Association of Independent Tire Dealers, Inc., was elected executive vice-president of that association at its recent annual meeting in Baltimore, Md.

M. G. HUNTINGTON, associated with the B. F. Goodrich Co. in various capacities since 1923, has been named manager of the Washington office of the national sales and service division of the company. He succeeds K. D. SMITH who assumes new company duties with headquarters in Detroit.

L. R. SHANNON, of the Firestone Rubber & Latex Products Co., Fall River, Mass., has been elected to membership in the Controllers Institute of America, the technical and professional organization of controllers.

LOREN DICKERSON, a member of the staff of Arthur D. Little, Inc., industrial consultants of Cambridge, Mass., was one of 28 members recently elected to membership in the 200 Associates of Phi Beta Kappa. The Associates were formed in 1940 to lead the national scholastic honorary society, which now has over 90,000 members.

DONALD H. SPICER, president, World Bestos Corp., Paterson, N. J., has been elected president of the Brake Lining Manufacturers' Association, Inc. The Association maintains headquarters at 370 Lexington Ave., New York City.

J. L. BENNETT, manager of chemical operations, Explosives Department, Hercules Powder Co., was elected president of the American Institute of Chemical Engineers at the annual meeting of the Institute held in Cincinnati on November 16. He served as vice-president last year.

ROBERT T. VANDERBILT, president of the R. T. Vanderbilt Co., New York City, was one of the sponsors of the "Industries Dinner" for Russian War Relief held at the Waldorf-Astoria Hotel in New York City on December 10. The dinner represented industry's salute to Russia during "Thanks to Russia Month."

PIETER HONIG, director of the Rubber Research Institute at Buitenzorg, Java, who left the Netherlands Indies just prior to the Jap invasion, is now in the United States and has been appointed commissioner of the Board for the Netherlands Indies, Surinam and Curacao, which has its headquarters in New York City. He is concerned with post-war problems.

F. A. COSGROVE, treasurer of Johnson & Johnson, New Brunswick, N. J., has been elected acting president to fill the wartime vacancy created by the resignation of ARTHUR R. CLAPHAM, who has joined the Navy as a lieutenant commander.

CHARLES G. DURBIN, control chemist, Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn., has been transferred to the Pennsylvania Ordnance Works operated by the parent company where he will act as assistant chemical superintendent.

CYRUS CHING, director of public and industrial relations, U. S. Rubber Co., who has been acting as an alternate member of the War Labor Board, has been named a regular member of that board representing industry. He succeeds E. J. MCMILLAN, resigned.

IN THE SERVICE

DR. R. J. NOBLE, latex consultant of Malden, Mass., who was called to duty with the Chemical Warfare Service in the capacity of a major several months ago, was recently made a lieutenant colonel. He is now acting as Chief of the Engineering Division of the C.W.S. at Edgewood Arsenal, Maryland.

FRANK J. GERARDI, chemist, associated with the Pawtucket, R. I., plant of the Anaconda Wire & Cable Co. for the past several years, and previously stationed at the Hastings-on-Hudson plant, is now a captain in the Chemical Warfare Service and is stationed at Edgewood Arsenal, Maryland.

P. E. DAVIS, assistant sales manager of the Ansbacher-Siegle Corp., Staten Island, N. Y., has entered the U. S. Coast Guard as an ensign. He recently reported for duty at St. Augustine, Florida.

Acquire Harmon Color Works

The American Home Products Corporation, Jersey City, N. J., has acquired the Harmon Color Works, East Paterson, N. J., through the medium of an exchange of stock, it has been announced. The arrangement called for the exchange of 18,000 shares of stock of American Home Products for 100 per cent of the stock of the Harmon Color Works. The latter concern will continue to operate under the same management as heretofore and will continue to produce organic colors, pigment dyestuffs and intermediates for the rubber, paint, ink, cosmetic and other industries. T. G. Sullivan, until recently associated with the Harmon Color Works, has joined the staff of Foster D. Snell, Inc., Brooklyn, N. Y.

CARBON BLACK USE IN 1941 REACHED NEW HIGH RECORD

New records in both the sale and production of carbon black during the year of 1941 were registered by the carbon black industry, according to a recent report made by the Department of Interior, based on statistics gathered in connection with the next edition of the *Minerals Year Book*, published annually by the Bureau of Mines.

Total production of all types of carbon black in the United States amounted to 594,065,000 pounds in 1941, including 487,967,000 pounds of channel black and 106,098,000 pounds by other processes. This compares with a 1940 total production of 568,792,000 pounds, including 491,765,000 pounds of channel black and 77,027,000 pounds by other processes.

The quantity of carbon black sold during 1941 amounted to 644,744,000 pounds as against 529,774,000 pounds in the preceding year. These sales figures also include exports which in 1941 were included in the sales total. The paint industry took 5,840,000 pounds of carbon black in 1941, against 6,806,000 pounds in the preceding year. Statistics show that 439,502,000 pounds went to rubber companies in 1941 as compared with 310,179,000 pounds in 1940.

The advance report points out that although the leading method of producing carbon black is still the channel process, the other processes — Lewis, roller, "special", and thermatomic—are gaining in importance. These other processes produced 18% of the total production in 1941, as compared with 14% in 1940 and 12% in 1939. The principal gain was made by the furnace or high-yield blacks and therefore the average yield rose from 1.54 pounds in 1940 to 1.63 pounds per thousand cubic feet of gas used in 1941.

Establish Reclaiming Committee

The formation of a rubber reclaiming committee has been announced by the Division of Industry Advisory Committees of WPB. Members of the committee are: Irving Laurie (Somerset Rubber Reclaiming), H. A. Winkelmann (Dryden Rubber Co.), V. L. Dingmon (Xylos Rubber Co.), Fred E. Traflet (Pequanoc Rubber Co.), John P. Coe (Naugatuck Chemical), and William H. Welch (Mid-West Rubber Reclaiming). The late Louis J. Plumb, president of the U. S. Rubber Reclaiming Co., was also named a member of this committee, and no replacement has yet been officially made. Willard Helburn, of the Office of the Rubber Director, is government presiding officer of the committee.

"Bubblfil," a special type of rayon yarn recently developed by du Pont, is said to be an excellent substitute for sponge rubber and kapok. A ceiling price of $1.25 a pound has been set on the new product by OPA.

Field Container for Gasoline

A new rubberized fabric container for battlefield rations of gasoline, designed to be carried by truck, plane, jeep or by a soldier on foot to replenish supplies of

gas in field equipment under fire, has been developed by the Seiberling Rubber Co., Akron. The bag holds 7½ gallons and weighs approximately 50 pounds when filled with gasoline. In the accompanying photograph, a worker at the Seiberling factory is putting the finishing touches on the new container.

Trade Group Elects Officers

The following officers of the Rubber Trade Association of New York, Inc., were elected at the annual meeting of the Association held in New York on November 12: *President*, A. L. Grant (Charles T. Wilson Co.); *Vice-President*, G. LeRoy Scheinler (Robert Badenhop Corp.); *Treasurer*, Jacobus F. Frank. B. G. Davy was re-appointed secretary-manager. Mr. Grant and Mr. Scheinler were also elected directors of the Association's dealer group, as were R. S. Hamilton (H. A. Astlett & Co.), F. Lester Kittle (F. Lester Kittle, Inc.), J. Louis (Littlejohn & Co.), and S. Pike, Jr.. (T. A. Desmond Co.). Directors of the broker and agent group include Mr. Frank, Philip Billhardt and Fred Pusinelli (Fred Pusinelli & Co.).

Montreal Hears Plastics Paper

An overflow attendance marked the meeting of the Rubber & Plastics Division, Montreal Section, Society of Chemical Industry, held at the Faculty Club of McGill University in Montreal on November 13. The meeting was addressed by A. E. Byrne, plastics sales engineer of the Canadian General Electric Co., Toronto, on the subject of "Plastics." Mr. Byrne discussed the chemical derivation of the various plastics and described in detail the glyptal resins manufactured by General Electric. The next meeting of the group is scheduled for December 16 at the Ritz-Carlton Hotel in Montreal. Dr. H. I. Cramer, of Sharples Chemicals, Inc., will be the principal speaker.

PUT CONTROL LABORATORIES UNDER TERMS OF ORDER P-43

Preference rating order P-43, which formerly could be used only by research laboratories, was revised on November 5 to permit production control laboratories to qualify and be granted serial numbers. The revised order assigns a rating of AA-2X to qualified serial numbered laboratories for the purchase of any material (including reagent chemicals) except for the construction of laboratory building or other similar structures.

However, it is pointed out by Wendell R. Turner, WPB Administrator of P-43, when the value of any item or quantity of the same item of material exceeds $50, the rating may not be used unless the purchase is specifically authorized by the Director General for Operations pursuant to application on Form PD-620. Specific authorization is not required for the purchase of any reagent chemicals irrespective of the value.

The revised order also assigns a rating of AA-4 for the purchase of any laboratory equipment which is authorized by the Director General for Operations under paragraph (b) (2) (vi) of Limitation Order L-144, pursuant to application on Form PD-620. Serial numbered laboratories must file monthly reports on Form PD-93 by the 15th of each month, whether any materials were purchased during the month or not.

Preference Rating Order P-135, also issued on November 5, supplements order P-43, but only so far as reagent chemicals are concerned. It does not cover equipment, but assigns a rating of AA-2X for deliveries of reagent chemicals for use by any laboratory for analytical, testing, control, educational, or research purposes, without the need of an application to, or approval by, the War Production Board.

New Items of Footgear

Three new items of footgear, two of them to be worn over the regular service shoe and the third a special type of non-skid low shoe, have been developed by the Quartermaster Corps for beach troops and the amphibian command The special shoe, known as the boatman-shoe, is provided with a canvas top and rubber sole and looks exactly like a tennis sneaker. Its sole, however, is unique in footgear since it is provided with a "tread", cut like a non-skid tire. The soles spread under the slightest pressure, thus offering a firm foothold under the wettest possible conditions. As a companion item, a boatman-overshoe has been developed for use in rough and wet weather. It fits snugly over the top of the boatman-shoe or of the service shoe and has the same kind of non-skid sole as the former. The third new item is a special type of wader-boot which is worn over the regular service shoe. It is made from rubber and rubberized materials.

LOS ANGELES NEWS

Los Angeles Standard Rubber Co. is completing a building at Gage and McKee Streets and will equip it for manufacturing purposes as soon as completed. It is a one-story brick building and will afford 11,000 square feet of floor space. The company now employs 104 workers. Thirteen former employees are now in the armed services.

Joseph Wehrly, former secretary to Franke A. Steele, general superintendent of the local Goodyear plant, and more recently in the production control department of the factory, has joined the Army and is currently stationed in San Francisco.

Charles Lamb, Jr., who has been shop foreman for the Bettis Rubber Co. for the past year, has resigned from that company and is now connected with the West American Rubber Co. which is managed by his father, Charles Lamb, Sr.

Karl Faulhaber, head of the Faulhaber Rubber Co., who recently decided to concentrate his activities in the plywood field, reports that he is doing quite well. Faulhaber Rubber is believed to be in possession of the largest press west of the Mississippi and this giant press has been adapted to plywood work .

Carl E. Stentz, director of research for Avery Adhesives, 453 East 3rd Street, has completed the installation of a new laboratory for that company as well as a small pilot plant for special experimentation on an adjacent street. Mr. Stentz recently returned from a hunting trip in the Imperial Valley where he bagged his full quota of pheasants and quail. Karl Faulhaber also had similar success recently in the same locality.

George Steinbach (H. M. Royal, Inc.) and Phil Drew (Goodyear) are busy with the job of getting the new year book for the Los Angeles Rubber Group into shape. A meeting of the group's directors was called for mid-December to decide on proposed additions to the book which will be bigger and better than the previous ones, according to the sponsors.

W. J. Voit, head of the W. J. Voit Rubber Corp., and a pioneer of the rubber goods manufacturing business in Los Angeles, is recovering from a severe illness which kept him from his office for several weeks.

T. Kirk Hill, head of the Kirkhill Rubber Co., was scheduled to leave for Dallas, Texas, in mid-December to visit the plant of the Arrowhead Rubber Co. of Texas, as well as to contact some of the trade.

Visitors from the Akron plants of the Goodyear Tire & Rubber Co. to the local Goodyear plant in recent weeks included P. W. Litchfield, chairman of the board; Cliff Slusser, vice-president in charge of production; and W. S. Wolfe, factory manager. On the other hand, Frank A. Steele, geenral superintendent of the local plant, and Charles Roese, manager of development engineering, spent some time in the Akron plants.

As this is being written all four of the big plants in the Los Angeles area are making plans for their usual Christmas festivities. These always include special ceremonies at which Santa Claus distributes gifts with a lavish hand to the children. Each party draws between 1,000 to 2,000 younsgters and good old Santa manages to turn up for each of them. The famous Goodyear blimp, from which Santa descended in past years, will be missing from the Goodyear party this year.

LOS ANGELES RUBBER GROUP STAGES A THEATRE PARTY

The Los Angeles Group, Rubber Division, A.C.S., took over one of Los Angeles' legitimate theatres on December 1 when approximately 350 members, wives and guests attended the showing of "The Drunkard," which has been running in that city for almost ten years. The occasion marked the first theatre party held by the group and the first time that members of the opposite sex had been invited to one of the group's functions.

In addition to the stage presentation, the motion pictures taken at the group's summer "outing" were shown for the edification of the female guests. Some twenty prizes were distributed, many of them consisting of war bonds and stamps, a number of the prizes having been purchased with group funds and a few others contributed by suppliers and manufacturers.

Two special surprises marked the party, when birthday cakes were presented to all members whose birthdays fell within the month of December and bridal bouquets were given to those couples whose wedding anniversaries occurred in the same month. It was generally agreed that the party was a grand success and talk of an early encore was heard on all sides.

FINANCIAL NEWS

Thermoid Company

Third Quarter: Net profit of $160,623, after provision of $72,050 for Federal and state income taxes, which includes adjustments for the six-month period. This is equal to 28c a common share and compares with $108,544, or 17c a share, for the corresponding period of 1941. For the first nine months of this year, net profit amounted to $424,174, or 73c a common share, against $542,999, or 98c a share, last year.

General Cable Corporation

Three Months to Sept. 30: Net income of $429,678 after all expenses, taxes and other charges, which compares with $773,984 last year. For the nine months ended September 30, 1942, net income after all expenses amounted to $1,797,302.

Master Tire & Rubber Corp.

Nine Months to Sept. 30: Net income of $78,647, after provision of $105,258 for taxes. Prospects for additional earnings by the end of the current year are reported favorable.

United Carbon Company

Nine Months Ended Sept. 30: Net profit of $1,285,842 after Federal income and excess profits taxes, equal to $3.23 a share, which compares with $1,214,551, or $3.05 a share, earned in the corresponding period of 1941. Provision for Federal income taxes this year amounted to $636,000 and excess profits taxes to $550,000.

Anaconda Wire & Cable Co.

Nine Months to Sept. 30: Net income of $1,448,540 after provision for Federal income and excess profits taxes and contingencies, equal to $3.43 each on 421,981 capital shares, which compares with $2,146,580, or $5.09 a share, in the corresponding period of the previous year.

Columbian Carbon Company

Nine Months to Sept. 30: Net income of $2,141,000, after deducting $1,700,000 for Federal income and excess profits taxes, equal to $3.98 a share each on 537,406 shares of capital stock, which compares with $2,540,968, or $4.73 a share after taxes of $1,430,000, last year.

OBITUARIES

Harrison E. Howe

Dr. Harrison E. Howe, editor of *Industrial & Engineering Chemistry* and other official publications of the American Chemical Society, died on December 10 in his home at Washington, D. C., at the age of 60. He had been suffering from a heart ailment since last spring. Dr. Howe was one of the nation's best-known chemists and writers on chemical subjects. He was the recipient of several honorary chemical awards, including one from the Society of Chemical Industry presented to him last month.

Born in Georgetown, Kentucky, on December 15, 1881, Dr. Howe took a B.S. degree at Earlham College in 1901, studied at the University of Michigan in 1901-02, and received degrees from the University of Rochester in 1913 and 1917, from Southern College in 1934, from the Rose Polytechnic Institute in 1936, and from the South Dakota State School of Mines in 1939. Prior to joining the American Chemical Society as editor, he was associated with the Sanliac Sugar Refining Co., Bausch & Lomb Optical Co., and Arthur D. Little, Inc. He was manager of the commercial department of the latter company in 1917-19.

Served in Army Ordnance

In the last war, Dr. Howe was a consultant in the Nitrate Division of the Army Ordnance Bureau. When O.P.M. was organized he served as chairman of the Chemicals Group and of the Chemical Priorities Committee. After O.P.M. was superseded by W.P.B., he became chairman of the Advisory Committee of the Chemicals Section. He was also a reserve colonel in the Chemical Warfare Service.

In addition to being a prolific writer where the technical journals were concerned, Dr. Howe was also an author of note. He wrote "The New Stone Age," "Profitable Science in Industry," and "Chemistry in the World's Work." With an associate he wrote a series of six nature and science readers and with another authored "Chemistry in the Home." In 1924-25 he edited "Chemistry in Industry," which was published in two volumes. Long an advocate of shorter work hours he acted as chairman of the committee on work periods of the American Engineering Council of the Federated Engineering Societies in 1922. The report of this committee indicated a tendency throughout the world toward abolition of the 12-hour day in favor of an 8-hour day. Protection of patent rights was another strong forte.

Dr. Howe leaves a widow, the former May McCaren, whom he married in 1905, and two married daughters.

Winfield Scott

Winfield Scott, one of the most popular research chemists on the staff of the Goodyear Tire & Rubber Co., died at the age of 54 in City Hospital, Akron, Ohio, on November 19, as the result of a heart attack suffered two weeks earlier. Widely known in chemical circles, Mr. Scott was awarded more than 100 patents and was a constant contributor to the technical literature, particularly on the behavior of compounding ingredients.

Mr. Scott was born in Senecaville, Ohio, was graduated from Oberlin College and took postgraduate work at the University of Washington, receiving his masters degree from that University. He served in the Chemical Warfare Service in the last war and joined Goodyear in 1918. Later, he went with the DuPont organization in Wilmington, Delaware, and in 1927 he joined the Rubber Service Laboratories, now part of the Monsanto Chemical Co., as chief chemist. He returned to Goodyear in 1933.

In addition to his membership in the Division of Rubber Chemistry, A.C.S., Mr. Scott was also a member of the American Institute of Chemical Engineers, the Franklin Club, and Sigma Xi, the honorary chemistry fraternity. At one time he served as president of the Akron Chapter of the American Chemical Society. He was also a member of the Westminster Presbyterian Church and served as an elder for many years.

Funeral services were held on November 21 with interment in Rose Hill Cemetery. A widow and two daughters survive.

William S. Farish

William Stamps Farish, president and chief executive of the Standard Oil Co. of New Jersey, died at Dietrich Farms, a hunting lodge which he and a group of friends maintained at Millbrook, N. Y., on November 29 at the age of 61. He was taken ill suddenly and died of a heart attack suffered shortly thereafter. Associated with the oil industry practically all his life, Mr. Farish achieved national prominence in recent months in connection with the synthetic rubber program, spending considerable time before Congressional committees in Washington defending Standard Oil's international patent agreements.

Mr. Farish was born in Mayersville, Miss., on February 23, 1881. He taught school to help pay his way through college and was graduated from the University of Mississippi with a law degree in 1900. He practiced law for only three months and then attracted by reports of the discovery of oil he went to Beaumont, Texas, at the age of 19. Later, he organized the Brown-Farish Oil Co. which he headed for twelve years, and still later formed a partnership with the late R. L. Blaffer which led, in 1917, to the organization of the Humble Oil & Refining Co., now part of the Standard Oil family.

During his lifetime Mr. Farish headed several of the larger oil organizations, including the Gulf Coast Producers Association and the Texas-Louisiana Oil & Gas Association. He also headed the famous committee of eleven chosen by the oil industry to report to President Coolidge and the Federal Oil Conservation Board on the oil resources of the nation and their probable life, the first authoritative study of oil reserves ever undertaken in the country. During the last war he served as a member of the National Petroleum War Service Committee. In 1933 Mr. Farish was named chairman of the board of Jersey Standard and in 1917 was elected president and chief executive officer, retaining the latter positions until his death.

Although Mr. Farish considered the oil industry as both his business and hobby, he was deeply interested in the breeding of fine horses. A Texan by choice, he had a host of friends in that state and maintained a home in Houston despite the fact that his business kept him in New York practically all of the time. Services were held both in New York and in Houston, with interment in Glenwood Cemetery, Houston. A widow, son and daughter survive.

Philip A. Doherty, Sr.

Philip A. Doherty, Sr., president of the Eugene Doherty Rubber Works, Inc., dental rubber manufacturers of Brooklyn, N. Y., died on November 21 at the Swarthmore-Vanderbilt Country Club in Manhasset, L. I. He was 70 years of age and had spent the greater part of his life with the Doherty concern, one of the oldest rubber manufacturing companies in the industry. In addition to his activity in the rubber field, Mr. Doherty was also a director of the Manufacturers Trust Co. Born in Boston, he lived in Brooklyn, N. Y., for most of his life. A grandson survives.

Gilbert C. Bacon

Gilbert C. Bacon, superintendent of the Zapon Division of the Atlas Powder Co., Stamford, Conn., died of a heart attack at the plant on December 1 while in conversation with an associate. He was 49 years of age. Born in Bridgeton, N. J., he was graduated from the Medico-Chirurgical School, now affiliated with the University of Pennsylvania, in 1914. He had been associated with Atlas Powder for more than 20 years and came to Stamford as superintendent in March, 1929. He leaves a widow and a son.

Robert L. Baird

Robert Lyle Baird, well known commodity broker associated with the crude rubber business for many years, died on November 15 at his summer home, The Meadows, in Quogue, L. I., at the age of 53. Death was due to a sudden heart attack. For the past ten years Mr. Baird was affiliated with the brokerage house of H. Hentz & Co., in New York City, but prior to joining that organization he acted for many years as vice-president of the Baird Rubber & Trading Co., which was founded by his father. Mr. Baird was descended from distinguished ancestors and was a veteran of the last war.

C. L. Weberg

C. L. Weberg, assistant comptroller of foreign operations for the Goodyear Tire & Rubber Co., died on a train on November 12 while on a southwestern business trip following a heart attack at Walnut Ridge, Arkansas. He was 58 years of age and had been associated with Goodyear since December, 1920, when he joined the company as an assistant treasurer. He was a graduate of the School of Commerce of New York University and was associated with Price Waterhouse & Co. before joining Goodyear. He leaves a widow and a son.

William H. Fenley

William H. Fenley, western manager of the Kerite Insulated Wire & Cable Co., of New York and Seymour, Conn., since 1922, died in his home at Riverside, Ill., at the age of 66 on November 22. Mr. Fenley was born in Greenwood, Indiana, and started his career in the railroad field, helping to build the Trans-Isthmian Duct and Cable Line in the Canal Zone around 1910. A widow survives.

A bulletin describing its line of Amsco industrial petroleum naphthas has been issued by the American Mineral Spirits Co., 230 North Michigan Ave., Chicago. A table of representative tests is also included.

Creation of a "plastic tread" for use on the wheels of Army hospital stretchers and related equipment was recently revealed by the plastics division of the Monsanto Chemical Co., Springfield, Mass. There is little possibility that it will replace rubber for such equipment after the war, it was stated, because of its higher cost.

"Flexoid" is the name of a new rubber tire preservative developed by the Boston Varnish Co., Boston, Mass., manufacturers of Kyanize paints, varnishes and enamels. Applied with an ordinary paint brush, the new preservative is said to dry in ten minutes.

Saving Tires and Tubes

A unique system in effect at Ellington Field, Texas, the world's largest multi-motor flying school, has resulted in the saving of many valuable airplane tires and tubes, according to officers of the field's Quartermaster Supply Sub-Depot. The tires and tubes, along with other rubber items used in maintaining the twin-engined training planes, are housed in a large ice-box, the temperature always being kept around 55° or 60°.

An informative booklet on its line of wax-fortified paints has been issued by S. C. Johnson & Son, Inc., Racine, Wisconsin. Recommendations for specific applications are included.

The giant, helium-filled rubber balloons used by R. H. Macy & Co., New York's leading department store, in their annual Thanksgiving Day Parade, have joined the scrap heap. Seven balloons in all were donated to the rubber scrap pile, having a total weight of 650 pounds. The balloons were designed by the late Tony Sarg and were made by Goodyear.

A new "speed warden" device designed to help motorists to comply with the 35-mile-per-hour conservation level has been developed by Goodrich. The device can be installed on all accelerator pedals and is easily adjusted on a level road so that the driver knows when the car has reached the 35 mile limit.

The plant of the Burke Golf Co. at Newark, Ohio, has been taken over by the Goodyear Aircraft Co. for the production of airplane parts. The company has also leased a furniture plant in Columbiana, Ohio, for the same purpose.

General Tire has been ordered by the Federal Trade Commission not to use the phrases "Dual 8" and "Dual 10" on its tires without disclosing the actual number of plies used in the construction of the tires. General's claim that cars equipped with these tires could be stopped 50% quicker than cars equipped with other tires was found lacking in evidence and the use of it in advertising matter prohibited.

The Ansonia O. & C. Company of Ansonia, Conn., has been awarded a contract by the Army Quartermaster Corps for a quantity of the new type special elastic cord made from vinyl resin yarn developed by the American Viscose Corp. The yarn is intended to replace rubber in a special application which cannot be disclosed now.

Rubber Mat Makers Penalized

Two stiff penalties for violation of the rubber regulations and restrictions were handed down in recent weeks by the War Production Board. On November 13 the Empire State Mat Co., Inc., Brooklyn, N. Y., which was accused of having illegally bought 7,236 used tires and cut them up for bathroom mats for sale to civilians, was forbidden to buy, sell or handle any kind of rubber until six months after the war, virtually putting the firm out of business. On November 24 the Long Island Mat Co., Lynbrook, L. I., N. Y., which was accused of using scrap rubber in the manufacture of approximately 3500 mats to fill civilian orders, was prohibited from accepting, delivering or consuming any rubber, including scrap and reclaimed rubber, for a period of six months.

To Produce Navy Goods

The Rubbercraft Corporation of America, which has its headquarters in the Lincoln Building in New York City, is reported to have leased a plant in Wallingford, Conn., for the manufacture of rubber goods for the Navy. Ralph M. Delaney is president of the company and M. G. Lederer is vice-president and general manager. B. E. Pollack and Samuel Markle are also vice-presidents of the company.

A handy method of storing and using plaster is found in the new Cut-Rak Adhesive Dispenser developed and marketed by the Seamless Rubber Co., New Haven, Conn. The dispenser holds several different widths of rolls, attaches securely to the wall, and at one time cuts any desired width or length.

A new strip material with the spongy effect of rubber strip has been developed by the Felt Products Mfg. Co., Chicago. Called the Fel-Pro Strip Material, it is produced by the application of Thiokol to a specially processed felt base, the finished product having a sponge rubber cushioning effect.

Scrap totalling 1,023,327 pounds, nearly one-sixth of the total amount collected by all of the plants in the busy Passaic, N. J., industrial district, was turned in by the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., during the first six months of the industrial scrap drive inaugurated by WPB. Manhattan's contribution included 923,238 pounds of cast iron and steel.

Six different types of industrial skin creams and lotions for protection of the worker's skin against industrial dermatitis have been introduced by the Mine Safety Appliances Co., Pittsburgh, Penna. Sold under the brand name of "Fend," the creams and lotions consist of cosmetically-safe materials, are easy to apply, and are bland and neutral.

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In the Rubber Industry these emulsions are being used today as *Latex Modifiers* and *Complete Latex Replacements* to extend, thicken, stabilize, increase penetration, improve resistance to acids, oils and solvents; in *Coatings* to produce adherent pigmented or clear coatings on paper, fabric, and rubber and as intermediate coats for lacquer on rubberized cloth; in *Rubberizing* textiles; in *Latex Treated Papers* to increase strength and improve ageing; in *Adhesives*, for paper, for leather to cloth, and cloth to cloth.

These are just a few of the known applications in the rubber field. Undoubtedly in your own plant you will find many uses for these emulsions to improve your products and extend the supply of the vital materials, LATEX, RECLAIMS, and SYNTHETICS.

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A Few of Our Products of Interest to the Rubber Industry

VULPRENE A series of polymers designed to replace rubber for insulation, coatings, and moldings where the extreme flexibility, tensile strength, and abrasion resistance of rubber are not required. Available in a wide variety of modifications for individual requirements.

ALKYD 18 An alkyd type resin emulsion which is non-yellowing and non-oxidizing. Film is water-white and non-tacky. Preferred where slight oxidizing action may be considered harmful to rubber. Extender for latex in coating, combining and impregnating processes.

EMULSION 58-8 A series of emulsified elastomers containing up to 65% solids. Recommended for use as full latex replacements in impregnation and combining.

PIGMENT BASES Concentrated aqueous dispersions of pigments in resin bases, available in all shades and viscosities, suitable for spreading, spraying, etc.

Also Acrylic, Vinyl, Maleic, Phenolic, Hydrocarbon, Ethyl Cellulose, Cellulose Acetate and Nitrate emulsions and solutions for various applications.

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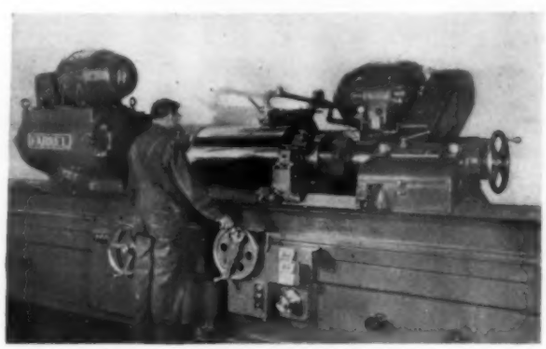
Industrial Aromatics Division

330 WEST 42nd STREET NEW YORK, N. Y.

NEW EQUIPMENT

Farrel Type TT Roll Grinder

Developed to meet today's needs for high output of precision ground rolls with a minimum of skill on the part of the operator, the Farrel Type TT Roll Grinder, recently introduced by the Farrel-Birmingham Co., Ansonia, Conn., is adaptable to the finishing of all types of rolls (chilled iron, alloy steel, brass, rubber,



Front view of the new Farrel Roll Grinder

granite, etc.) used in the rolling of any sheet materials (all metals, rubber, plastics, paper, etc.). It will grind either straight, concave or convex contours to exact symmetry and accuracy.

The new grinding unit incorporates a traveling work table and a fixed grinding wheel unit. Essentially, the standard machine (without tapering attachment) consists of a front bed upon which is superimposed a traveling work table, traveling on inverted "V" ways. On this table are mounted the headstock, including motor and drive, footstock and neck rests for supporting the roll to be ground. The table is traversed by means of an adjustable speed, reversible motor and two-speed gear unit mounted on a base locked to the back of the front bed.

A back bed is provided for the grinding wheel unit. This bed is keyed and bolted to the front bed. The wheelhead rests on a sub-base which is hinged in front on two tapered trunnions. Interposed between sub-base and back bed is an intermediate base. In machining the back bed, provision is made for future installation of a tapering unit. This attachment, supplied at additional cost, is used for grinding roll journals or tapered sections of heavy shafting.

Seven motors are required—eight if a tapering attachment is incorporated in the machine. Grinding wheel and headstock are driven through V-belt drives. The gear unit for the traveling table is driven by a reversing motor through a V-belt drive. All controls are conveniently arranged at the operator's station at the front of the machine. An electric cable reel, carrying cables for energizing the headstock motor, is mounted on the back of the front bed.

Farrel Type TT Roll Grinders are built in three sizes, to take maximum diameters of 24, 28 and 32 inches and in any length required.

Cochrane Two-Pen Flow Recorders

Where panel space is at a premium, or where it is desired to have two related flow records on the same chart for ready comparison, the new two-pen electric flow meter (which is actually two complete flow meter receivers mounted within one double depth case) developed by the Cochrane Corp., Philadelphia, Penna., is said to achieve the result without complication and with no loss of accessibility. Both receiver mechanisms can be swung out and operated in the swung-out position. The connection between the rear receiving mechanism and its pen arm must necessarily be detachable and is arranged with a self-aligning V-notch junction.

Where two related measurements are involved, the operator has often sufficient guidance by observing the coincidence (or lack of it) of the two pens. However, this does require that he note which pen is which. For cases where continual reference must be made to this relationship of the two records, ratio indicating pointer can be incorporated. The clearly visible red target moves to right or left from the center point on the scale and thus shows at a glance whether there is an excess or deficiency of one of the quantities with respect to the other. The pointer movement moreover is two and one-half times greater than the difference between the two recording pens and is thus much more readily noted.

Integrating feature can be furnished on both mechanisms but reading of rear mechanism integrator requires opening case and swinging front mechanism forward.

Multi-Contact Timers

A line of multi-contact timers, designed to automatically control a sequence of "on" and "off" operations of a single or multiple number of electrical circuits in accordance with a pre-determined operating program, has been introduced by the R. W. Cramer Co., Inc., Centerbrook, Conn.

The new timers may be used to control a series of machine operations in definite order; to automatically reverse or alternate in operation a group of motors, machines or devices; and to operate in a pre-determined sequence as well as numerous other applications where sequence operations are of prime importance.

Features of the multi-contact timers are said to include the following: self-starting synchronous motor, complete gear trains operating in oil, Bakelite cams mounted on shaft in identical pairs so the "off" and "on" increments can be adjusted to the desired operating program, manual operation, and contacts in plain view so that their operations can be observed. The timers can be provided with remote momentary starters.

A new portable forced-induction pump, which will handle such materials as sealing compounds, sound deadeners, insulating materials, putty, viscous grease, etc., has been added to the line featured by the Lincoln Engineering Co., St. Louis, Mo. These materials can be pumped directly from original container to point of application.

Improve the tack WITH

CRYSTEX insoluble SULPHUR

Crystex, an amorphous sulphur, improves the tack by preventing bin-cure and dryness which usually occur when a high percentage reclaim compound is used.

Crystex prevents bloom in uncured rubber stocks. It does not dissolve in rubber but will "stay put" at temperatures usually prevailing during storage periods. Crystex is of outstanding value when employed in the manufacture of stocks to be used for repair materials, in retread stocks, valve-patch frictions, and other products.

The characteristics of Crystex indicate that further uses may be found for this product in the rubber making industry.

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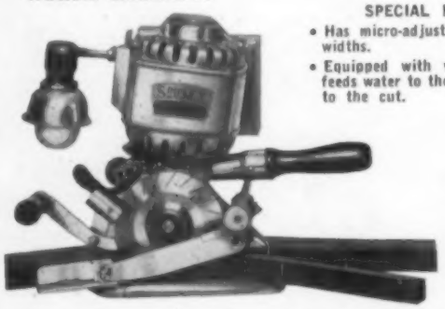

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- Equipped with water tank which feeds water to the slotted knife and to the cut.
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Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Can be used to trim conveyor belts, cut sponge, pure gum, uncured stocks, etc. Cuts squarely—no rejects.

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REVIEWS

BOOKS

Commodity Year Book (Master Edition). Prepared and published by the Commodity Research Bureau, Inc., 82 Beaver St., New York, N. Y. 8½ x 11 in. 413 pp. $7.50.

Commodity Statistics (1942). Prepared and published by the Commodity Research Bureau, Inc., 82 Beaver St., New York, N. Y. 8½ x 11 in. 294 pp. $5.00 (Combination price for both volumes, $10.00).

The Commodity Research Bureau is now offering its Commodity Year Book series, established four years ago, in two separate volumes, one termed the *Commodity Year Book (Master Edition)* and the other *Commodity Statistics.* The latter is in reality the 1942 Commodity Year Book and is the fourth annual edition of this standard reference work.

The *Master Edition* represents a commodity encyclopaedia. Whereas the preceding volumes of this excellent work on commodities were confined to discussions on background, processing and marketing of the 75 basic commodities, together with comprehensive statistical sections on each, the *Master Edition* has gone considerably further and covers virtually all the important raw and semi-finished products that serve to make up our national economy. There are separate articles on 836 different commodities which are the basis for military and civilian maintenance, with such detailed information as physical analysis, source of production, principal uses and finished products, actual and possible substitutes, and importance in the war effort.

This edition stresses the tremendous advance which has been marked by various synthetics and points out how substitute materials have been used to excellent advantage. In the discussion on synthetic rubber, which occupies five pages, the editors take a very optimistic view of the future as regards supplies. Buna, Butyl and neoprene are discussed at some length. A detailed analysis of the plastics industry, prepared with the cooperation of the Society of the Plastics Industry, which explains molding and fabricating methods and presents authoritative data on each of the plastic types, is also included.

The second volume, *Commodity Statistics,* will enable those who have purchased previous Year Books to have up-to-date figures for most of the statistical tables published in previous editions. With the country at war, certain information and statistics are naturally withheld from publication and accordingly, as in the case of rubber, the statistical tables included are mainly duplicates of those which appeared in the previous edition.

●

Plastics for Industrial Use. By John Sasso. Published by the McGraw-Hill Book Co., Inc., 330 West 42nd St., New York, N. Y. 6 x 9 in. 229 pp. $2.50.

This is an engineering handbook of plastic materials and methods for their use. Written from the engineers' standpoint, chemistry, except as it affects strength or performance, has not been included, Emphasis is placed on comparative properties, methods of selection for specific uses, and proper design. There are 17 chapters in all, early chapters giving the basic information needed before any plastic can be adapted to engineering use and the subsequent chapters each devoted to a specific plastic, containing practical information on properties for that particular plastic. The appendix consists of a directory of trade names, suppliers and molders. A comprehensive subject index is included. The author, incidentally, is associate editor of *Product Engineering.*

Science Remakes Our World. By James Stokley. Published by Ives Washburn, Inc., 29 West 57th St., New York, N. Y. 5¾ x 9 in. 298 pp. $3.50.

Written in simple, non-technical language and intended for the layman, this book tells what science is creating today in the industrial laboratories of the nation. The author runs the entire gamut of synthetics and substitutes, and treats with the creation of new materials, especially the plastics, in an easy, understandable manner. The book is factually correct in practically all aspects since the author seems to have carefully checked his subject matter with leading technologists. The author, himself, is well qualified in his own right, having been associated with the editorial staff of Science Service and with Franklin Institute as an associate director. He is at present connected with an industrial research laboratory. A chapter on rubber and synthetic rubber, under the title "Rubber from Tree and Test Tube," is of course included, while an appendix gives the chemical structures of "Rubber and Its Relatives."

•

Men, Machines and Morals. By Julian Street. Published by the Osborn Manufacturing Co., 5401 Hamilton Ave., Cleveland, Ohio. 5½ x 8 in. 75 pp.

This book commemorates the fiftieth anniversary of the Osborn Manufacturing Co., one of the nation's largest manufacturers of brushes, and fifty years' direction of the company by its president, Franklin G. Smith. Mr. Smith is also president of the Ohio Rubber Co., of Willoughby, Ohio. The book is well written and illustrated with clever pen and ink drawings. It traces the growth of the company under Mr. Smith's management, tells of its early trials and tribulations, and is an excellent tribute to an able executive.

BOOKLETS, CATALOGS, Etc.

23 Ways to Conserve the Life of Your Multiple V-Belt Drives. Multiple V-Belt Drive Association, 140 So. Dearborn St., Chicago, Ill. 8½ x 11 in. 16 pp.

This book is a contribution to the rubber conservation movements and its sole purpose is to educate power users in the proper procedure of selection, installation and maintenance of multiple V-belt drives in order to obtain maximum life out of every belt. It is not an academic engineering hand book, but rather a primer on the subject, written and illustrated in a simple, easy-to-understand manner.

•

Tag Non-Indicating Temperature and Pressure Controllers. (Catalog No. 9000E). C. J. Tagliabue Mfg. Co., Park and Nostrand Avenues, Brooklyn, N. Y. 8½ x 11 in. 36 pp.

The complete line of non-indicating controllers, diaphragm valves and accessories made by the company is described and illustrated in this new catalog. Included are descriptions of two new instruments, Tag No. 42, a non-indicating controller, and a new self-operating temperature controller. As usual, complete specifications are given.

•

Installation Parts. (Bulletin No. 63). Chapman Electric Neutralizer Co., Portland, Maine. 8½ x 11 in. 12 pp.

This bulletin has been prepared to help department heads in the requisitioning of replacement parts for the Chapman static neutralizers. These parts, each with a code number, are illustrated and briefly described for identification. Recommendations for the care of inductor bars are included in the bulletin.

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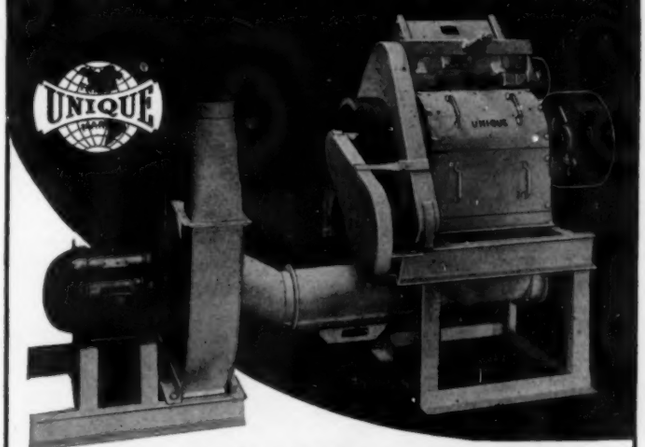

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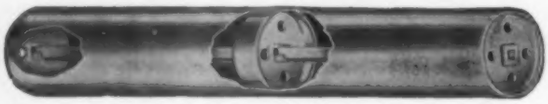

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REVIEWS (CONT'D)

Factice. By Muriel E. Whalley. Published by National Research Council of Canada, Ottawa, Canada. 8½ x 11 in. 50 pp. 50c.

This brochure is intended as a guide to the literature on the subject of factice. It is a compilation of abstracts of articles and patents on the subject made from British Chemical Abstracts (1882-1940), American Chemical Abstracts (1907-1941), and books on rubber in the library of the National Research Council. The articles are arranged alphabetically according to author and the patents are listed chronologically. Representing the first comprehensive compilation on factice, this abstract work is a valuable contribution to the literature.

•

The Contents of 325 Employee Magazines. Policyholders Service Bureau, Metropolitan Life Insurance Co., New York, N.Y. 8½ x 11 in. 74 pp.

This report is the second of a series on the subject of employee publications issued by Metropolitan Life in recent months, the first one being entitled "Employee Magazines." As indicated by the title, it discusses and illustrates in considerable detail the nature of the material currently being used in 325 employee papers, which have proved to be one of the best mediums for stimulating and maintaining employee morale in these troublesome times. The report includes a table which summarizes under various headings and subheadings the types of material found in the publications studied.

•

Vinylite Resins: Their Forms, Properties and Uses. Plastics Division, Carbide and Carbon Chemicals Corp., 30 East 42nd St., New York, N. Y. 8½ x 11 in. 20 pp.

This booklet describes briefly the four major types of vinyl resins and the various plastic materials produced from them, including rigid sheets, flexible sheeting and film, molding and extrusion compounds, adhesives and resins for surface coatings. In addition, it contains tables of properties as well as charts showing the principal applications of Vinylite plastics. Since many of these materials now find place as substitutes for rubber, this book is especially timely.

•

Enlisted for the Victory. Bibb Manufacturing Co., Macon, Georgia. 11 x 8¼ in. 24 pp.

The role played by Bibb textiles in the manufacture of war products is told textually and pictorially in this colorful booklet. These products include collapsible boats, camouflage nets, hangars, tents, tires, electrical wires, gas masks, rifle slings, canteen covers, knapsacks, ammunition belts, leggings, uniforms, parachutes, targets, and a host of additional items. Reference to the use of Bibb materials in the manufacture of nets and maitre cord lines used in catching sharks is also made.

•

Bowser Industrial Equipment Catalog. S. F. Bowser & Co., Inc., Fort Wayne, Indiana. 5 x 8 in. 40 pp.

The full line of equipment for the handling and control of industrial liquids made by the company is described and illustrated in this pocket-size catalog. Equipment described includes that for filtration and distillation, lubrication, metering, pumping, refueling, and storage and dispensing. An index is provided in the catalog so that any special piece of equipment may be readily located.

•

Economical operation of the company's **worm gear speed reducers** is emphasized in "Background," an 8-page booklet published by the Cleveland Worm & Gear Co., Cleveland, Ohio. A number of testimonial letters are reproduced.

Firestone Tires in the Construction Field. Firestone Tire & Rubber Co., Akron, Ohio. 8½ x 11 in. 24 pp.

Means and methods of securing greatly increased life from tires used on all types of excavating and construction equipment are outlined in this new booklet. For example, it points out that air pressures should be checked daily on a three-shift job and every other day on a one-shift job to make certain that tires are neither under nor overinflated. It also emphasizes the fact that the condition of the roadway on which construction equipment is used has a vital bearing on whether or not the tires will deliver their full potential mileage.

•

A Wartime Guide to Monsanto Plastics. Monsanto Chemical Co., St. Louis, Mo. 8½ x 11 in. 16 pp.

Written primarily to help busy war production executives get a clear picture of what plastics really are, what they are doing to help win the war, and what they promise in postwar progress, this booklet describes briefly the basic types of Monsanto plastics, their possibilities and limitations, and illustrates a few of the war jobs they are now filling. Monsanto is currently featuring six different types of plastics, including polystyrene, vinyl acetal, and phenolic compounds.

•

Limits of Inflammability of Butadiene in Air. (R. I. 3565). By G. W. Jones and R. E. Kennedy. Bureau of Mines, Department of the Interior, Washington, D. C. 8 x 10½ in. 6 pp.

To answer inquiries that have been received by the Bureau of Mines as to the explosive hazards of butadiene, the combustible gas used in most of the synthetic rubber processes, its limits of inflammability in air have been determined, and the results are given in this research report. Test procedures are described and apparatus used is illustrated.

•

Vinylite Wire and Cable Insulation Plastics. Halowax Products Division, Union Carbide and Carbon Corp., 30 East 42nd St., New York, N. Y. 8½ x 11 in. 16 pp.

The practical advantages of wire and cable insulation made from Vinylite plastics are outlined in this new booklet. Vinylite has replaced rubber in many important purposes. The booklet also contains tables indicating the physical and electrical properties of the compounds, as well as typical applications. Standpoints of installation, service and safety are discussed.

•

The Asbestos Factbook. Published by Asbestos Magazine, Inquirer Building, Philadelphia, Penna. 5 x 7½ in. 16 pp. 10c.

The origin, facts, locations, uses, analyses and qualities of asbestos are covered in this compact little booklet. The section on uses breaks such uses down by product, including raw asbestos, asbestos yarn, asbestos cloth, felt, tape, paper, millboard, etc. Three types of asbestos are analyzed —chrysotile, blue and amosite. The booklet should be of interest to anyone concerned with the use of asbestos in any form.

•

Much of the large subject of **overhead materials handling** is covered in Booklet No. 2008-A published by the Cleveland Crane & Engineering Co., Wickliffe, Ohio. Engineering and application data is given.

The **Squeegee Type Pump,** which features a flexible rubber tube in its construction, is described and illustrated in Bulletin No. 1041, published by the Huber Pump Division, Downingtown Mfg. Co., Downingtown, Penna.

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, DEC. 12, 1942

Crude Rubber

INCREASED optimism regarding deliveries of crude rubber from the Latin American countries has been voiced unofficially by Government authorities in recent weeks. There is evidence that supplies from Nicaragua, for example, will amount to five or ten times the original estimates. This is also true of some of the other South and Central American countries, although the estimates in some cases were so small that even doubled and tripled actual supplies would not be very large. The first shipment of crude rubber from Nicaragua in almost thirty years was received in the United States last month. It was flown in by Tom Braniff, American airline pioneer.

Considerable interest was also expressed in the plan advanced by Brazilian authorities to put at least 50,000 tappers in the rubber-bearing areas by the end of next year. This plan provides for furnishing rest stations, health clinics, etc., along the right of way, since the trip must be made by land. It is believed that within the next two months some 2,000 tappers will be sent into the jungle areas weekly. This number, of course, will gradually dwindle.

Samples of cryptostegia rubber from the stands already established in Haiti, where 100,000 acres will eventually be placed under cultivation, in accordance with the agreement between Shada and the Rubber Reserve Co., have reached this country. According to an initial report, the rubber compares quite favorably with that from the Hevea and Castilla trees. Special tapping methods have been developed by Shada for the cryptostegia vines and it is probable that these methods will be extended to other areas under cultivation in the Western Hemisphere.

The first report on the cultivation of *Kok-Sagyz* in this country was made early this month. The report, emanating from the Michigan Experimental Station of the Department of Agriculture, indicated that *Kok-Sagyz* has good potentialities when properly cultivated and discussed some new planting methods.

Prices shown below are those set by Rubber Reserve:

As of December 12
Fixed Government Prices

Plantations—			
Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.22½
No. 2	—	@	.22¼
No. 3	—	@	.22
No. 4	—	@	.21¾
Thin Latex Crepe	—	@	.23
Thick Latex Crepe	—	@	.23
Brown Crepe, No. 1	—	@	.21¾
Brown Crepe No. 2	—	@	.21
Amber Crepe, No. 2	—	@	.21¾
Amber Crepe, No. 3	—	@	.21
Brown Crepe, Rolled	—	@	.17
Latex—			
Normal, carload lots, tanks	—	@	.2595
Normal, carload lots, drums	—	@	.2825
Conc., carload lots, tanks	—	@	.2765
Conc., carload lots, drums	—	@	.2950
Guayule—			
Ampar	—	@	.28
Paras—			
Up-River, fine	—	@	—
Acre Bolivian, fine	—	@	—
Balata—			
Surinam Sheet	—	@	.81
Prime Manaos Block	—	@	.71
Peruvian Prime	—	@	.70
Venezuelan Block	—	@	.73

Scrap Rubber

Dealers report fair amounts of scrap rubber entering trade channels, and point out that although present volume is below current consumption, present stocks, due to the recent nation-wide scrap rubber drive, are sufficient to meet the needs of the reclaimers for months to come. The status of Amendment No. 3 to Revised Price Schedule 87 (Scrap Rubber) has been clarified. This amendment raised the ceiling prices on scrap rubber. Because of objections from the reclaimers, the Rubber Reserve Co. has agreed to continue to sell scrap on the basis of the previous prices until at least April of next year. Prices shown below on typical scrap classifications are *not* those contained in the amended price schedule but *are* those currently in use:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$18.00
Beadless passenger tires	ton	24.00
Mixed truck tires	ton	18.00
Beadless truck tires	ton	24.00
No. 1 passenger peelings	ton	47.50
No. 1 truck peelings	ton	47.50
Gray carcass	ton	47.50
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06¾
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¾
Black truck tubes	lb.	.05¾
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00
Black mechanical scrap, above 1.10	ton	20.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, America, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	—	@ 7.818
40x40	36 in.	6.15	lb.	—	@ 6.991
40x36	36 in.	6.50	lb.	—	@ 6.615
48x48	40 in.	2.50	lb.	—	@16.200
48x48	40 in.	2.85	lb.	—	@14.210
56x60	40 in.	3.60	lb.	—	@11.944
48x44	40 in.	3.75	lb.	—	@11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

The price for middling uplands on the Exchange has moved in a 79 point range since our last report, high for the period being 20.49 on December 10 and low 19.70 on November 20. The market was fairly steady from November 12 to November 21, a price of 20.20 being quoted on the latter date. Due to the report of the possibility of a separate peace with Italy, occasioned by the news from the African front, heavy liquidation set in on November 23, with the result that the price dropped 50 points. Renewed trade buying, bolstered by rumors from Washington that an increase in the parity price of cotton was in the offing, strengthened the market on the following day, and the price rose to 20.01. It jumped to 20.23 on November 25, fell off to 20.10 on November 30, and then climbed steadily to 20.46 on December 5. It tapered off slightly in the next few days and then jumped to 20.49, high for the period on December 10. In the past day or two a cautious feeling was evident in the trade because of the growing possibility that farm labor costs may be written into the parity figure. Quotations for middling uplands on the Exchange follow:

	Nov. 10	December 12		
	Close	High	Low	Close
December	18.63	19.27	19.07	19.04
March	18.74	18.82	18.74	18.78
July	18.87	18.54	18.46	18.50

Reclaimed Rubber

Due to the reclaimed rubber tire program, plus greater production of camelback for the recapping program, the demand for reclaim has increased considerably in recent weeks. Reclaimers state, however, that there are ample supplies on hand to meet this increased demand and contemplate no immediate expansion of the production rate. They also point out that greatly increased supplies can be produced when necessary, providing the necessary labor supply is available. Prices shown below are ceilings on typical grades of reclaim:

Shoe				
Unwashed	lb.	.07	@	.07¼
Tube				
Black Tube	lb.	.11¼	@	.11½
Red Tube	lb.	.12	@	.12¼
Tires				
Black (acid process)	lb.	.07½	@	.07¾
Black, selected tires	lb.	.06½	@	.06¾
Truck, Heavy Gravity	lb.	.08½	@	.08¾
Miscellaneous				
Mechanical blends	lb.	.04½	@	.05½
White	lb.	.13	@	.13¼

Ducks

Enameling (single filling)	lb.	—	@	.44¼
Belting and Hose	lb.	—	@	.39
Single filling, A grade	lb.	—	@	.19¾
Double filling, A grade	lb.	—	@	.20¾

CHEMICAL MARKETS

New York, Dec. 12, 1942
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.28	.33
A-10	lb.	.36	.42
A-11	lb.	.52	.65
A-19	lb.	.52	.65
A-32	lb.	.60	.70
A-77	lb.	.42	.55
A-100	lb.	.42	.55
Aldehyde ammonia, crystals	lb.	.65	.70
Altax	lb.	.43	.45
Beutene	lb.	.59	.64
B-J-F	lb.	.38	.43
Butyl Zimate	lb.	—	1.13
Captax	lb.	.38	.40
Crylene	lb.	.40	.47
Di-Ortho-Tolyguanidine	lb.	.44	.46
Diphenylguanidine	lb.	.35	.36
El-Sixty	lb.	.40	.47
Ethyl Zimate	lb.	—	1.13
Ethylidene aniline	lb.	.42	.43
Formaldehyde aniline	lb.	.31	—
Guantal	lb.	.49	.50
Hepteen	lb.	.34	.39
Hexamethylenetetramine	lb.	.33	—
Lead Oleate, No. 999	lb.	.13	—
Witco	lb.	.15	—
Ledate	lb.	—	1.48
Methyl Tuads	lb.	—	1.53
Methyl Zimate	lb.	—	1.23
Monex	lb.	—	1.53
Pentex	lb.	.74	.84
Phenex	lb.	.50	.55
Pip-Pip	lb.	—	1.65
R & H 50-D	lb.	.42	.43
R-2	lb.	1.40	1.80
R-2 Crystals	lb.	1.55	1.70
Rotax	lb.	.48	.50
Safex	lb.	1.15	1.25
Selenac	lb.	—	1.98
SPDX	lb.	.70	.75
Super-Sulfur No. 2	lb.	.13	.15
Thiocarbanilid, drums	lb.	.28	.33
Thiurad	lb.	—	1.55
Trimene	lb.	.54	.64
base	lb.	1.03	1.18
Triphenylguanidine	lb.	.45	—
Ulto	lb.	1.25	1.75
Ureka	lb.	.50	.57
Blend B	lb.	.50	.57
Blend C	lb.	.48	.55
Vulcanex	lb.	.42	.43
Vulcanol	lb.	.85	—
Inorganic			
Litharge, domestic	lb.	.07	.07½
Magnesia, calcined, heavy	lb.	.04	—

COLORS

Blacks (See Next Column)			
Blues [b]			
Prussian	lb.	.36	—
Ultramarine	lb.	.17	.27
Browns [b]			
Mapico	lb.	.1135	—
Umber, Turkey	lb.	.04¾	—
Greens [b]			
Chrome	lb.	—	.25
Guignet's Green	lb.	.70	—
Reds			
Antimony crimson, 15/17	lb.	—	—
sulfur, free	lb.	—	—
Indian	lb.	.08¾	—
Domestic (Maroon)	lb.	.11	—
Mapico	lb.	.096	—
Red oxide, pure	lb.	.10	.12
Rub-Er-Red	lb.	.09¾	—
Whites [b]			
Cryptone No. 19	lb.	.0560	.0585
Cryptone CB No. 21	lb.	.0560	.0585
Cryptone ZS-800	lb.	.0825	.0850
Lithopone:			
Albalith	lb.	.04¼	.04½
Astrolith	lb.	.04¼	.04½
Azolith	lb.	.04¼	.04½
Ray-cal	lb.	.05½	.05¾
Rayox	lb.	.14½	.15¼
Titanox A	lb.	.14½	.14¾
Titanox B	lb.	.05¾	.06
Titanox C	lb.	.05½	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼	.07½
Anaconda, lead free	lb.	.07¼	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼	.07½
XX Red—4	lb.	.07¼	.07½
XX Red—72	lb.	.07¼	.07½
XX Red—103	lb.	.07¼	.07½
Kadox, black label—15	lb.	.07¼	.07½
Red label—17	lb.	.07¼	.07½
St. Joe, black label	lb.	.07¼	.07½
green label	lb.	.07¼	.07½
red label	lb.	.07¼	.07½
U. S. P.—7, bbls.	lb.	.10½	.10¾
Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½	.09¾
Green seal—8	lb.	.09	.09¼
Red seal—9	lb.	.08½	.08¾
Yellows [b]			
Cadmolith	lb.	.55	.60
Chrome	lb.	—	.50
Mapico	lb.	.071	—

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

BLACKS
(In bags, carload lots)

Aerfloted Arrow	.0355	—
Certified	.0355	—
Certified Spheron	.0355	—
Channel "S"	.12	—
Continental	.0355	—
Disperso	.0355	—
Dixiedensed	.0355	—
Dixiedensed 66	.0355	—
Excello	.0355	—
Furnex	.03½	.06
Furnex Beads	.03½	.06
Gastex	.03½	.06
Kosmobile	.0355	—
Kosmobile 66	.0355	—
Kosmos-Dixie 20 lb.	.03½	.06
Micronex (Amarillo)	.0355	—
Micronex Beads (Amarillo)	.0355	—
Pelletex	.03½	.06
P-33	.0475	—
Shell Carbon (Del. Midwest)	.025	—
Supreme	.0355	—
Thermax	.0225	—
Thermax "S"	.0675	—
Wyex	.0355	—

COMPOUNDING MATERIALS

Aluminum Flake ton	18.00	24.50
99½%-300 ton	—	16.50
86-90%-300 ton	—	13.50
Asbestine ton	16.50	20.00
Barium carbonate (98-100%) ton	47.00	49.00
Barytes ton	25.35	36.00
Bentonite ton	11.00	16.00
Blanc fixe, dry ton	60.00	67.50
Calcene ton	37.50	43.00
Catalpo (fact.) lb.	.02	—
Chalk, precipitated		
Suprex white ton	32.50	45.00
Clay, Aerfloted, Suprex ton	10.00	22.50
Aerfloted Paragon ton	10.00	22.50
Crown (f.o.b. plant) ton	11.00	—
Dixie ton	—	11.00
Langford ton	—	8.50
McNamee ton	—	10.00
Par ton	—	11.00
Witco ton	10.00	—
Cotton Flock (Dark) lb.	.10½	.13
Kalite No. 1 ton	—	26.00
Kalite No. 3 ton	—	36.00
Kalvan ton	—	100.00
Kalvan "S" lb.	—	.09½
Magnesium carbonate lb.	.06¾	—
Mica ton	35.00	44.00
Mineralite ton	—	30.00
Pyrax A ton	—	7.50
Rottenstone (powd. Dom.) ton	25.50	37.50
Rubberol lb.	—	.17½
Silene (calcium silicate) lb.	.04	.045
Starch, powdered cwt.	2.90	4.10
Talc, domestic ton	17.00	25.00
Whiting, commercial ton	16.00	26.00
Columbia Filler ton	9.00	14.00
Witco ton	6.00	—
Wood Flour (100 mesh) ton	30.00	32.00

MINERAL RUBBER

285°-300° Mineral Rubber ton	25.00	—
Black Diamond ton	25.00	—
Genasco, solid (factory) ton	—	—
Hard Hydrocarbon ton	25.00	27.00
MilliMar lb.	—	.05½
Parmr, solid ton	—	—
Pioneer, MR, solid ton	—	—

MISCELLANEOUS

Aromatics—Rodo #0 lb.	4.00	4.50
Rodo #10 lb.	5.00	5.50
Curodex 19 lb.	2.75	—
Curodex 188 lb.	3.50	—
Curodex 198 lb.	4.50	—
Para-Dors lb.	4.50	—
Aresklene No. 375 lb.	.35	.50
Darvan (dispersing agent) lb.	.30	.34
Santomerse S lb.	.11	.25
Sponge Paste lb.	—	.18
Sunproof lb.	.22¾	.27¾
Tackol (tackifier) lb.	.085	.18
Tonox lb.	.50	.59
Ty-Ply gal.	6.75	8.00
Unicel (blowing agent) lb.	.50	—

SOFTENERS

Acids			
Acetic, 28%, bbls. [a] 100 lb.	3.38	3.63
Nitric, 36 degrees cwt.	5.00	—
Acids, Fatty			
Laurex lb.	.14¾	.17¼
SL #10 lb.	.12	.14
Stearex Beads lb.	.10	.11
Stearite lb.	.10	—

Alkalies			
Caustic Soda, 76% cwt.	2.70	5.70
Soda Ash, 58% cwt.	1.15	2.98
Oils			
Cycline Oil gal.	.14	.20
Degras, bbls. lb.	.11	.12½
Para-Flux gal.	.17	.18
Para-Lube lb.	.046	.048
Petrolatum, amber [b] lb.	.03¾	.04½
Pigmentaroil, tank cars gal.	.20½	—
in drums gal.	.26½	.27½
Pine, tanks gal.	.55	—
Rosin Oil, cmpd. gal.	.40	—
Rubberol lb.	.13½	.14
Rubtack lb.	.10	—
Seedine, c.l. lb.	.07¼	—
Tackol lb.	.08½	.18
Witco Palm Oil lb.	—	—
Witco Softener No. 20 gal.	.20	—
Woburn No. 8, c.l. lb.	.06	—
Resins and Pitches			
Pitch, Burgundy lb.	.06	—
coal tar ton	19.00	22.00
hardwood ton	16.00	22.50
pine, 200 lb. gr. wt. bbl.	—	4.50
Pigmentar, tank cars gal.	.20½	—
in drums gal.	.26½	.27½
Retort Pine Tar, drums gal.	.26½	.27½
Solvents			
Acetone, pure [a] lb.	.07	—
Benzene, 90%, tank car gal.	.14	—
Beta-Trichlorethane gal.	—	.20
Bondogen lb.	.98	1.05
Carbon, bisulfide lb.	.05	.08½
Carbon tetrachloride gal.	.73	1.27
Dichlorethylene lb.	—	—
Dipentene, cml., drums gal.	.48	.50
Ethylene dichloride lb.	.07½	.08½
Plastogen lb.	.07¾	.08
Reogen (drums) lb.	.11½	.12
Rub-Sol gal.	.09½	—
Trichlorethylene lb.	.08	.09½
Turpentine, spirits lb.	.78½	—
dest. dist., drums gal.	.50	.55
Waxes			
Beeswax, white [b] lb.	.61	—
Carnauba, yellow [b] lb.	.87	.89
Ceresin, white, dom. lb.	.13½	.15
Montan, crude lb.	.45	.46
Paraffin [a]		
Yellow crude scale, 124/126 lb.	.04¼	—
Refined, 123/125 lb.	.05¼	—

ANTI-OXIDANTS

Agerite Alba lb.	1.95	2.05
Gel lb.	.52	.54
Hipar lb.	.61	.63
Powder lb.	.43	.45
Resin lb.	.43	.45
Resin D lb.	.43	.45
White lb.	1.23	1.33
Albasan lb.	.69	.74
Antox lb.	.54	.56
B-L-E lb.	.48	.57
Flectol H lb.	.52	.65
Flectol White lb.	.90	1.15
Neozone A, B, C, D, E lb.	.43	.63
Oxynone lb.	.77	.90
Retardex lb.	.45	.48
Santoflex B lb.	.52	.65
Santovar A lb.	1.15	1.40
S.C.R. lb.	.33	.35
Stabilite lb.	.52	.54
Stabilite Alba lb.	.70	.75
VGB lb.	.48	.57

EXTENDERS

Naftolen lb.	.15	.25
Vanzak gal.	.05	.06

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene lb.	.35	.50
Cocoa Soapstock lb.	.06	.08
Colite gal.	.90	1.15
Dipex lb.	.06	.08
Glycerized Liquid Lubricant gal.	—	1.35
Lubrex lb.	.25	.30
Mineralite ton	—	30.00
Mold Paste lb.	.12	.18
Sericite ton	65.00	75.00
Soap Tree Bark, cut, sifted lb.	.06	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex lb.	.25	—
Amberex Type B lb.	.18¾	—
Black lb.	.08½	.13
White lb.	.09	.15
Brown lb.	.10	.14
Neophax A lb.	.16½	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2 lb.	.08	.12
Sulfur Chloride, yellow (drs.) lb.	.03	.08
Sulfur, rubber makers		
Refined (bags) cwt.	2.55	—
Commercial (bags) cwt.	2.20	—
Telloy lb.	1.75	—
Vandex lb.	1.75	—

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Industry.

The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York, N. Y.

Chemicals and Compounding Materials

ACCELERATOR Z 51
- Good Aging Properties
- Free from Rapid Overcure
- Safe Processing Properties
- Low Dosages for Optimum Cures

Advance Solvents & Chem. Corp.
245 Fifth Ave. New York, N. Y.

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-46; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H, White; Santoflex B, BX; Santovar A.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York, N. Y.

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 39 years.*
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ALUMINUM HYDRATES
"Alorco" Hydrated Aluminas reinforcing pigments give many desirable properties to rubber. Send for sample.
ALUMINUM CO. OF AMERICA
1970 Gulf Bldg. Pittsburgh, Pa.

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CALCENE— The Ideal low gravity, white reinforcing pigment. Gives high tensile and elongation properties with exceptionally good resistance to tear and abrasion.
PITTSBURGH PLATE GLASS CO.,
COLUMBIA CHEMICAL DIV.
Grant Bldg., Pittsburgh, Pa.

CARBON BLACK— *Micronex*
the world's standard gas black, universally known as the "King of Rubber Pigments."
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41 East 42nd St. New York City

CARBON BLACK
CONTINENTAL
The Newest Name in Carbon Black offers
CONTINENTAL DUSTLESS
CONTINENTAL COMPRESSED
CONTINENTAL UNCOMPRESSED
Continental Carbon Company
295 Madison Ave., New York, N.Y.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
J. M. Huber, Inc.
460 West 34th St. New York

CARBON BLACK
"Atlantic" Carbon Blacks meet the exacting standards of modern rubber production.
Chas. Eneu Johnson & Co., Mfrs.
Distributed by
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Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
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CARBON BLACK
WITCO DISPERSO
and DUSTLESS and a
Complete Line of High Quality
Rubber Chemicals
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Do you believe in Your Products?
Then you should believe in telling the rubber industry about them. The MARKET PLACE is the logical place to display your wares.

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
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33 Rector Street New York City

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Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
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79 Milk St. Boston Mass.
Cable Address: Jacobite Boston

CHEMICALS

For Rubber		For Industry Generally
Accelerators	*Acids*	*Latex*
Antioxidants	*Oil of Myrbane*	*Lotol*
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NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK

CHEMICALS
For Natural & Synthetic Rubber
"PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.
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CHEMICALS
A complete line of plasticizers, resins, substitutes, fillers, etc., for Synthetic, Natural and Reclaimed Rubber.
STANDARD CHEMICAL COMPANY
Akron Savings & Loan Bldg, Akron

CHEMICALS AND MINERAL
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York

COAL TAR CHEMICALS

Coumarone Resins	Tack Producers
Resinous Oils	Dispersing Oils
Reclaiming Oils	Softeners
Solvents	

The Neville Company
Neville Island, Pittsburgh, Penna.

The Market Place

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Rubber Industry. If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York, N. Y.

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COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
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78 Goodyear Ave. Malrose, Mass.
Offices in New York, Akron, Chicago

FURNEX—FURNEX BEADS
—A cool mixing reinforcing black for Footwear and Mechanicals. Good ageing —Improved oil resistance.
Binney & Smith Co.
41 East 42nd St. New York City

PARA-DORS—
overcome odors in rubber—effectively and at low cost.
GIVAUDAN-DELAWANNA, INC.
Industrial Aromatics Division
330 West 42nd St., New York, N. Y.

COLORS
BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

GASTEX
Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.
Herron & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon Div.,
General Properties Co., Inc., Pampa, Texas

PARA-FLUX
The Universal Softener—Adaptable, Uniform. Improves Quality—Economical.
The C. P. Hall Co.
2510 First Central Tower
Akron Ohio

COMPOUNDING Materials
Vulcanizing Agents
Accelerators
Antioxidants
Plasticizers
Dispersions
Pigments
Clays
Mineral Rubber
Aromatics
Blacks
R. T. VANDERBILT CO.
230 Park Ave. New York City

IRON OXIDES
Asbestine—Barytes—Talc—Soapstone
C. K. Williams & Co.
EASTON, PA.

PELLETEX (The pellet *Gastex*)
The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.
Herron & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon Div.,
General Properties Co., Inc., Pampa, Texas

CUMAR —Paracoumarone Resin.
A neutral gum for rubber compounding.
Samples and prices on request.
The Barrett Div.
Allied Chemical & Dye Corp.
40 Rector St. New York City

LAMP BLACKS
Produced according to the rigid specifications of the makers of EAGLE and OLD STANDARD Germantown Brands.
THE L. MARTIN COMPANY, Inc.
Unit of Columbian Carbon Co.
BINNEY & SMITH CO.
Distributor of Rubber Blacks
41 East 42nd Street New York, N. Y.

RUBBER PROCESSING OILS
For outstanding compatibility in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
Philadelphia Pennsylvania

DU PONT Rubber Chemicals
DU PONT RUBBER COLORS
DU PONT ACCELERATORS
DU PONT ANTI-OXIDANTS
E. I. du Pont de Nemours & Co., Inc.
RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

MAGNESIUM OXIDE
Calcined Magnesium Oxide prepared for use in the compounding of neoprene. Full details on request.
J. T. Baker Chemical Co.
Phillipsburg New Jersey

RUBBER SUBSTITUTES
White, brown and black.
The Carter Bell Mfg. Co.
Springfield, New Jersey

EXTENDER
NAFTOLEN R 100 — Extender for Crude Rubber, Reclaim, Synthetics.
Wilmington Chemical Corporation
10 E. 40th St., New York, N. Y.

MAPICO COLORS
Pure Oxides of Iron
Yellows—Reds—Browns—Black
MAGNETIC PIGMENT CO.
Manufacturers
BINNEY & SMITH CO.
Distributors
41 East 42nd Street, New York, N. Y.

SOFTENERS
Rosin Oil — Pine Tar
Burgundy Pitch
"Galex" — a non-oxidizing Resin
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RKO Bldg. New York, N. Y.

"FACTICE"—Prevents blooming, makes colors fast and a smoother batch.
(Reg. U. S. Pat. Off.)
Stamford Rubber Supply Co.
Stamford, Conn.

MOLD LUBRICANT
"Orvus" enables articles to leave molds readily; molds clean easily. Effective in hardest water. Also acts as thorough cleanser for molded and extruded rubber goods.
PROCTER & GAMBLE
Cincinnati Ohio

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STEAREX BEAD
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AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66
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INDEX TO ADVERTISERS

Advance Solvents & Chemical Corp. 214, 272
Akron Equipment Co. 275
Akron Standard Mold Co. 274
Albert & Son, L. 274, 277
Aluminum Co. of America 272
Aluminum Flake Co. 272
Aluminum Ore Co. 272
American Cyanamid & Chemical Corp. 272
American Resinous Chemicals Corp. 263
American Zinc Sales Co. 274

Baird Rubber & Trading Co., Inc. 214, 275
Baker Chemical Co., J. T. 273
Barr Rubber Products Co. 276, 277
Barrett Div., Allied Chemical & Dye Corp. 201, 273
Beacon Co. 274, 277
Binney & Smith Co. ..... Insert Following 244; 214, 272, 273, 274
Black Rock Mnfg. Co. 274
Brockton Cutting Die & Machine Co. 269, 274

Carter Bell Manufacturing Co., The 269, 273
CLASSIFIED ADVERTISING 277
Cleveland Liner & Mnfg. Co. ..... Back Cover, 280
Colonial Insulator Co. 274
Columbian Carbon Co. ..... Insert Following 244; 214
Connor, Charles F., & Co., Inc. 275
Continental Carbon Co. 207, 272
Continental Machinery Co. 266, 274
Continental Rubber Co. 275

Dispersions Process, Inc. 275
Du Pont de Nemours & Co., E. I. ..... Inside Front Cover, 273, 276

Gammeter, W. F., Co. 268, 274
General Atlas Carbon Div. 199, 273
General Latex & Chemical Corp. 276
Givaudan-Delawanna, Inc. 264, 273

Hall Co., The C. P. 272, 273
Herron & Meyer 199, 273
Heveatex Corporation 273, 275
Huber, J. M., Inc. 272
Hycar Chemical Co. 191, 276

Interstate Welding Service 274

Jacoby, Ernest, & Co. 272, 276
Johnson, Charles Eneu, & Co. 272
Johnson & Son, S. C., Inc. 267, 274

Loewenthal Co. 211

Magnetic Gauge Co. 206
Magnetic Pigment Co. 273
Martin, L. & Co., Inc. 206, 273
Monsanto Chemical Co. (R. S. Dept.) 272, 273
Moore & Munger 196, 272
Muehlstein & Co., H., Inc. 195

National Carbón Company, Inc., Carbon Sales Div. 205, 275
National Rosin Oil & Size Co. 268, 273
National Sherardizing and Machine Co. 269, 275
Naugatuck Chem. Div. U. S. Rubber Co. 220, 272, 275, 276
Neville Co. 272
New Jersey Zinc Co. 198, 274
Noble, R. J. 276

Olin Laboratories, The R. R. 276

Pancorbo, M. 274
Pennsylvania Industrial Chemical Corp. 194, 272
Pequanoc Rubber Co. 209, 276
Pittsburgh Plate Glass Co., Columbia Chemical Div. 210, 272
Porotex Products 276
Procter & Gamble 273
Proctor & Schwartz, Inc. 274

Rand Rubber Co. 276
Randall, Frank E. 274
Rare Metal Products Co. 269, 272
Revertex Corp. of America 275
Robinson Mfg. Co. 267, 275
Royle & Sons, John 197, 274
Rubber & Plastics Compounds Co., Inc. 276

St. Joseph Lead Co. 274
Schulman, A., Inc. ..... Inside Back Cover, 276
Scott Co., Henry L. 268, 275
Simplex Cloth Cutting Machine Co., Inc. 266, 275
Skelly Oil Co., Solvents Div. 200, 273
Stamford Rubber Supply Co. 273, 278
Stanco Distributors, Inc. 203, 276
Standard Chemical Co. 215, 272
Stauffer Chemical Co. 265, 274
Stearns Magnetic Mfg. Co. 275
Sun Oil Co. 218, 273

Textile Proofers, Inc. 202, 276
Thiokol Corp. 213, 276
Titanium Pigment Corp. 192, 274

Union Carbide and Carbon Corporation 275
United Carbon Co. 204, 272
United Shoe Machinery Corp. 275
U. S. Rubber Co., Naugatuck Chemical Div. 220, 272, 275, 276
U. S. Rubber Reclaiming Co. 276
Utility Mfg. Co. 275

Vanderbilt, R. T., Co. ..... Front Cover, 273

Weber, Hermann, Co. 275
Whittaker, Clark & Daniels, Inc. 210, 272
Williams, C. K., & Co. 268, 273
Wilmington Chemical Corp. 193, 273
Wishnick-Tumpeer, Inc. 217, 272

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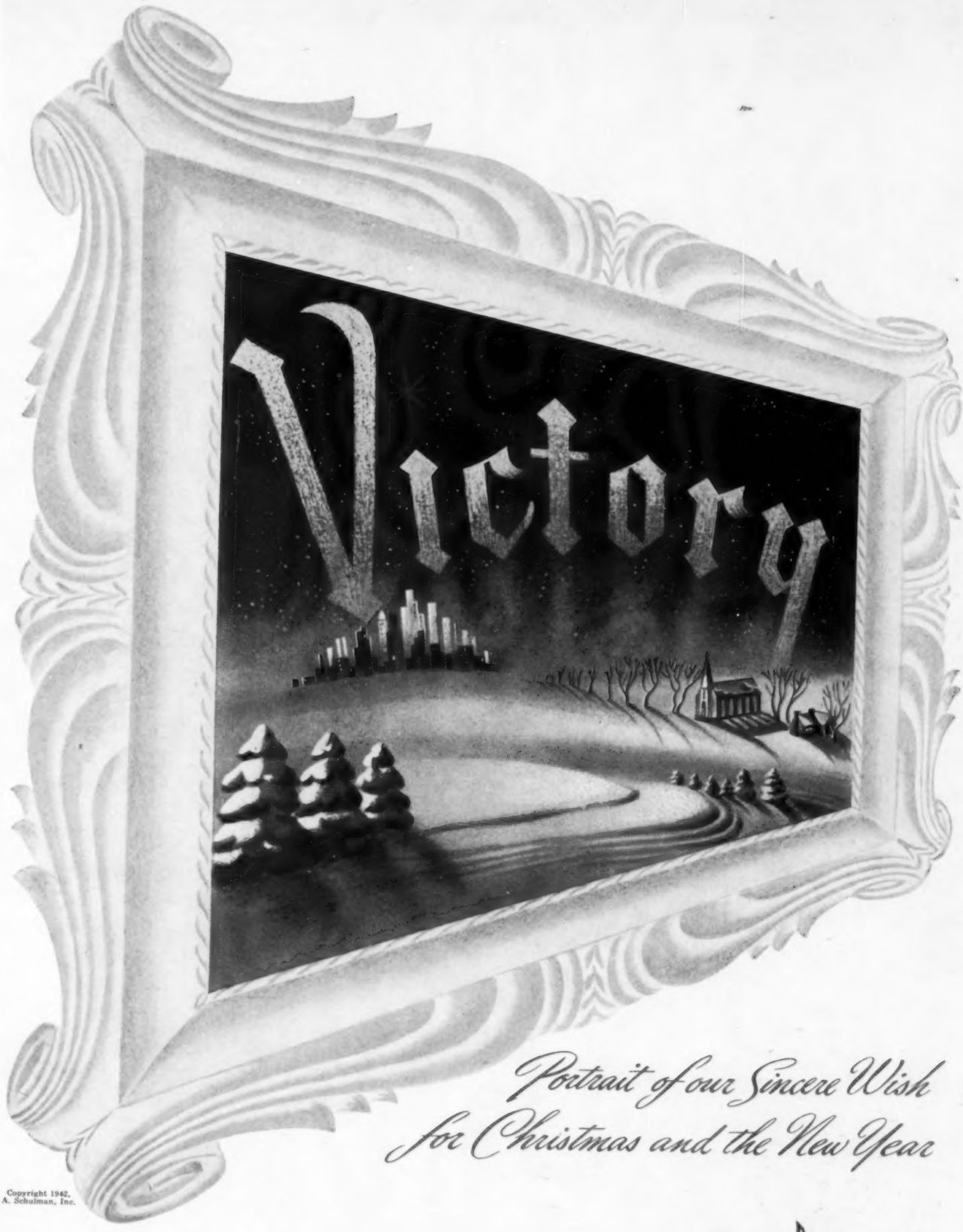

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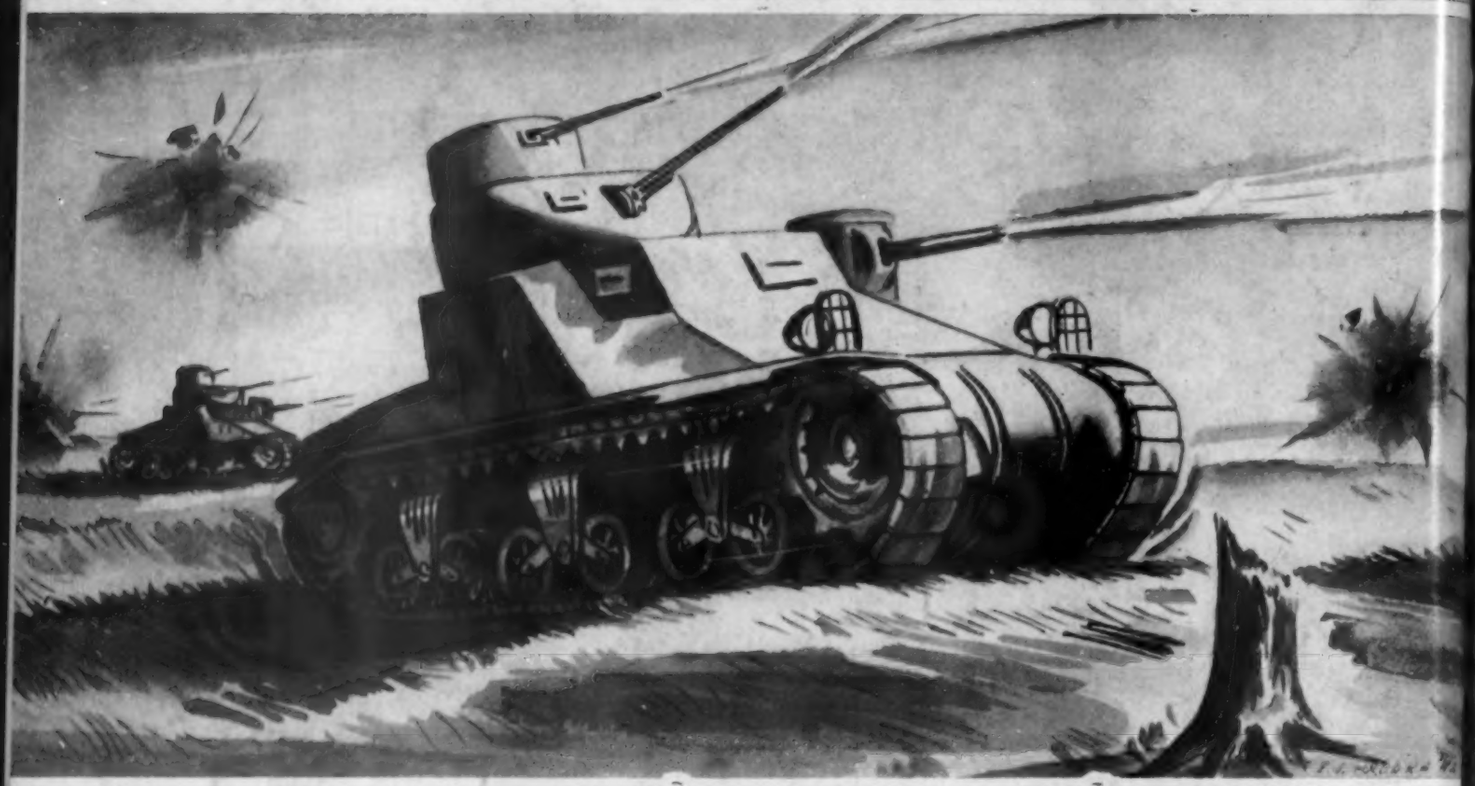

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